

System x iDataPlex dx360 M3  
Types 6385, 6386, and 6391



# User's Guide



System x iDataPlex dx360 M3  
Types 6385, 6386, and 6391



# User's Guide

**Note:** Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 79, the *Environmental Notices and User's Guide*, and the *Warranty and Support Information* document on the IBM *Documentation CD*.

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**



**DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

**To Connect:**

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

**To Disconnect:**

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

**Statement 2:**



**CAUTION:**

When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

**Statement 3:**



**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

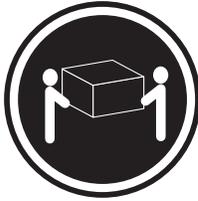


**DANGER**

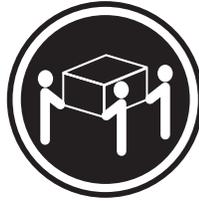
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

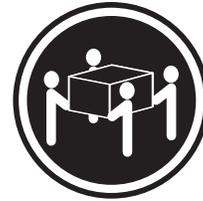
**Statement 4:**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

**CAUTION:**

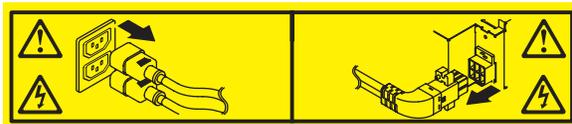
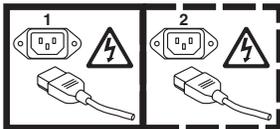
Use safe practices when lifting.

**Statement 5:**



**CAUTION:**

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



**Statement 8:**



**CAUTION:**

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

**Statement 10:**



**CAUTION:**

Do not place any object on top of rack-mounted devices.





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## Chapter 1. Introduction

IBM® System x™ iDataPlex™ products are ideally suited for data-center environments that require high-performance, energy-efficient, cost-effective hardware. The modular design of the iDataPlex components makes it possible for you to order customized server solutions that meet the specific needs of your current environment.

This *User's Guide* contains general information about how to use, upgrade, and configure the components in your customized server solution. These components consist of the IBM System x iDataPlex dx360 M3 system-board tray (dx360 M3 Type 6391 system-board tray), an IBM System x iDataPlex 2U Flex Chassis (Type 6385 2U chassis) or an IBM System x iDataPlex 3U Chassis (Type 6386 3U chassis), the IBM System x iDataPlex Storage enclosure (storage enclosure), and the IBM System x iDataPlex I/O enclosure (I/O enclosure).

Depending on what you ordered, you received one or more of the following server solutions:

- Two dx360 M3 system-board trays installed in a 2U chassis
- One dx360 M3 system-board tray and one storage enclosure installed in a 2U chassis
- One dx360 M3 system-board tray and one I/O enclosure installed in a 2U chassis
- One dx360 M3 system-board tray installed in a 3U chassis

See Chapter 2, “Components, features, and controls,” on page 13 for detailed information about the components in the customized server solutions.

The iDataPlex products come with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

You can obtain up-to-date information about the IBM iDataPlex products and other IBM server products at <http://www.ibm.com/systems/x/>.

If you participate in the IBM client reference program, you can share information about your use of technology, best practices, and innovative solutions; build a professional network; and gain visibility for your business. For more information about the IBM client reference program, see <http://www.ibm.com/ibm/clientreference/>.

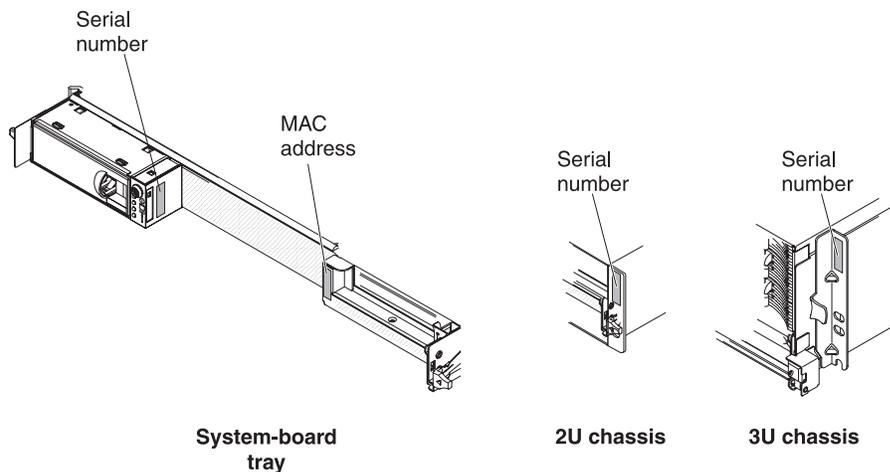
At <http://www.ibm.com/support/mysupport/>, you can create a personalized support page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly e-mail notifications about new technical documents, search for information and downloads, and access various administrative services.

The system-board tray serial number is on a label at the front of the system-board tray. The system-board tray integrated management module (IMM) media access control (MAC) address is on a tab at the right side of the system-board tray. The chassis machine type and serial number are on a label on the front of the chassis at the right side.

Label locations are shown in the illustration following the table. This illustration might differ slightly from your hardware.

Record information about the server in the following table.

|  |  |
|--|--|
| <b>Product name</b>                        | IBM System x iDataPlex dx360 M3                  |
| <b>Machine type (system-board tray)</b>    | Type 6391  |
| <b>Serial number (system-board tray)</b>   | _____  |
| <b>IMM MAC address (system-board tray)</b> | _____  |
| <b>Machine type (chassis)</b>              | Type 6385 (2U chassis) or Type 6386 (3U chassis) |
| <b>Serial number (chassis)</b>             | _____  |



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## Related documentation

In addition to the printed *Important Notices* document and this *User's Guide*, the following documentation for the dx360 M3 system-board tray, 2U chassis, and 3U chassis is provided in Portable Document Format (PDF) on the IBM *Documentation CD*:

- *Environmental Notices and User's Guide*  
This document is in PDF on the IBM *Documentation CD*. It contains translated environmental notices.
- *Problem Determination and Service Guide*  
This document contains information to help you solve problems yourself, and it contains information for service technicians.
- *Safety Information*  
This document contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Warranty and Support Information*  
This document contains information about the terms of the warranty and getting service and assistance.

Depending on the hardware configuration, additional documentation might be included on the IBM *Documentation CD*.

The iDataPlex documentation might be updated occasionally, or technical updates might be available to provide additional information that is not included in the documentation. These updates are available from the IBM Systems Information Center. To check for updated iDataPlex information and technical updates, go to <http://publib.boulder.ibm.com/infocenter/idadaplx/documentation/index.jsp>.

The updated iDataPlex documentation also is available from the IBM Support Web site. To check for updated documentation and technical updates, complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x iDataPlex dx360 M3 server** and click **Go**.

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## The IBM Documentation CD

The IBM *Documentation CD* contains documentation in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

## Hardware and software requirements

The IBM *Documentation CD* requires the following minimum hardware and software:

- Microsoft Windows XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

## Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in your server and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type  
`e:\win32.bat`

- where *e* is the drive letter of the CD or DVD drive, and click **OK**.
- If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the `/mnt/cdrom` directory:  

```
sh runlinux.sh
```

Select the device from the **Product** menu. The **Available Topics** list displays all the documents for the devices. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

---

## Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

---

## Features and specifications

The following information is a summary of the features and specifications of the hardware. Depending on the hardware configuration, some features might not be available, or some specifications might not apply.

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1U-high device is 1.75 inches tall.

|   |   |   |
|---|---|---|
| <p><b>Microprocessor:</b> One or two up to six-core Intel Xeon microprocessors with integrated memory controllers in each system-board tray</p> <p><b>Note:</b> Use the Setup utility to determine the type and speed of the microprocessor.</p> <p><b>Hard disk drives:</b> The system-board tray supports one 3.5-inch simple-swap SAS (with the optional SAS controller), one 3.5-inch simple-swap SATA, or two 2.5-inch simple-swap SATA hard disk drives or solid-state drives. The system-board tray with an attached enclosure can support the following drive configurations:</p> <ul style="list-style-type: none"> <li>• Up to four 3.5-inch simple-swap SAS or SATA hard disk drives with the storage enclosure and optional SAS controller</li> <li>• Up to five 3.5-inch simple-swap SATA hard disk drives with the storage enclosure</li> <li>• Up to eight 2.5-inch simple-swap SATA/SAS or solid-state hard disk drives (with an optional RAID controller) with the storage enclosure</li> <li>• Up to two 3.5-inch simple-swap SATA hard disk drives with the I/O enclosure</li> <li>• Up to two 3.5-inch simple-swap SAS hard disk drives with the I/O enclosure and optional SAS controller</li> <li>• Up to four 2.5-inch simple-swap SATA/SAS or solid-state hard disk drives (with an optional RAID controller) with the I/O enclosure</li> <li>• Up to twelve 3.5-inch hot-swap SAS or SATA (with the optional SAS controller) hard disk drives in a 3U chassis</li> </ul> | <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Sixteen DIMM connectors (eight per microprocessor)</li> <li>• Minimum: Two DIMMs per microprocessor</li> <li>• Maximum: 192 GB</li> <li>• Type: Registered ECC double-data-rate 3 (DDR3) -800, -1066, and -1333 MHz DIMMs, 1.5V RDIMMs or 1.35V capable RDIMMs</li> <li>• Sizes: 2 GB single-rank/dual-rank, 4 GB dual-rank, 8 GB dual-rank, and 16 GB quad-rank</li> <li>• Chipkill supported with selected DIMMs</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Integrated management module (IMM), which provides service processor control and monitoring functions, video controller, and (when the optional virtual media key is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities</li> <li>• Dedicated or shared management network connections</li> <li>• Integrated Trusted Platform Module (TPM) support</li> <li>• Six Serial ATA (SATA) ports</li> <li>• Serial over LAN (SOL) and serial redirection over Telnet or Secure Shell (SSH)</li> <li>• Dual-port Gigabit Ethernet controller</li> <li>• Front connectors for USB 2.0 (2 ports), serial, video, and RJ-45 (3 ports) <ul style="list-style-type: none"> <li>– One systems-management RJ-45 port for connection to a dedicated systems-management network</li> <li>– Two RJ-45 LAN ports</li> </ul> </li> </ul> <p><b>Predictive Failure Analysis (PFA) alerts:</b></p> <ul style="list-style-type: none"> <li>• Memory</li> <li>• Hard disk drives</li> </ul> | <p><b>Expansion slots:</b> Up to two PCI Express slots total. Support for the following riser cards:</p> <ul style="list-style-type: none"> <li>• One PCI Express x16 slot (x16)</li> <li>• Two PCI Express x16 slots(x16) with one PCI Express x8 slot (x8)</li> <li>• One PCI Express x8 slot (x8) supports an optional RAID controller only (some configurations)</li> </ul> <p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Server on: 10°C to 35°C (50°F to 95°F); altitude: 0 to 914.4 m (0 to 3000 ft). Derate maximum temperature by 1°C for every 304.8 m (1000 ft) increase in elevation to a maximum of 3048.0 m (10000 ft) at an ambient temperature of 28°C</li> <li>– Server off: 10°C to 43°C (59°F to 109.4°F); maximum altitude: 2133 m (7000 ft)</li> </ul> </li> <li>• Humidity: <ul style="list-style-type: none"> <li>– Server on: 10% to 80%</li> <li>– Server off: 8% to 80%</li> </ul> </li> </ul> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>• Height: <ul style="list-style-type: none"> <li>– 2U chassis: 8.6 cm (3.39 inches)</li> <li>– 3U chassis: 13.0 cm (5.1 inches)</li> </ul> </li> <li>• Depth: 51.3 cm (20.2 inches)</li> <li>• Width: 44.6 cm (17.6 inches)</li> <li>• Weight: <ul style="list-style-type: none"> <li>– 2U chassis: <ul style="list-style-type: none"> <li>- Fully loaded: 22.7 kg (46.1 lb)</li> <li>- Without system-board trays: 7.1 kg (15.6 lb)</li> </ul> </li> <li>– 3U chassis: <ul style="list-style-type: none"> <li>- Fully loaded: 28.1 kg (62.0 lb)</li> <li>- Without hard disk drives: 15.4 kg (34.0 lb)</li> </ul> </li> </ul> </li> </ul> <p><b>Electrical Input:</b></p> <ul style="list-style-type: none"> <li>• Input voltage low range (not applicable to 750 W dual AC input power supply): 100 V ac (minimum) to 127 V ac (maximum), sine-wave input (50 - 60 Hz)</li> <li>• Input voltage high range: 200 V ac (minimum) to 240 V ac (maximum), sine-wave input (50 - 60 Hz)</li> </ul> |
|---|---|---|

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## What your dx360 M3 system-board tray offers

The dx360 M3 system-board tray uses the following features and technologies:

- **Active PCI Express x16 Generation 2 adapter capabilities**

The dx360 M3 system-board tray has up to three connectors for PCI Express adapters on up to three riser cards. These connectors accept x8 or x16 adapters.

- **Dynamic System Analysis (DSA) programs**

The DSA programs collect and analyze system information to aid in diagnosing problems. The diagnostic programs collect the following information:

- System configuration
- Network interfaces and settings
- Installed hardware
- Service processor status and configuration
- Vital product data, firmware, and Unified Extensible Firmware Interface (UEFI) configuration
- Hard disk drive health
- RAID controller configuration
- Event logs for ServeRAID controllers and service processors

The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to IBM service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser.

- **Integrated management module**

The integrated management module (IMM) combines service processor functions, video controller, and (when an optional virtual media key is installed) remote presence function in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) version 2.0
- Simple Network Management Protocol (SNMP) version 3
- Common Information Model (CIM)
- Web browser

- **Integrated network support**

The dx360 M3 system-board tray comes with an integrated Intel dual-port Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see “Configuring the Gigabit Ethernet controller” on page 71.

- **Integrated Trusted Platform Module (TPM)**

This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification, when the software is available. See [http://www.ibm.com/servers/eserver/xseries/scalable\\_family.html](http://www.ibm.com/servers/eserver/xseries/scalable_family.html) for details about the TPM implementation. You can enable TPM support through the Setup utility under the **System Security** menu choice.

- **Large data-storage capacity and hot-swap capability**

The dx360 M3 system-board tray supports one 3.5-inch simple-swap SAS, one 3.5-inch simple-swap SATA, or two 2.5-inch simple-swap SAS hard disk drives, or SATA hard disk drives, or solid-state drives. An optional SAS controller must be installed when you use SAS hard disk drives.

With the storage enclosure attached, the system-board tray can support up to four 3.5-inch SATA or up to four 3.5-inch simple-swap SAS (with optional SAS controller) hard disk drives, or five simple-swap SATA hard disk drives, or eight 2.5-inch simple-swap SAS hard disk drives, or simple-swap SATA hard disk drives, or solid-state hard disk.

With the I/O enclosure attached, the system-board tray can support up to two 3.5-inch simple-swap SATA hard disk drives, or up to two 3.5-inch simple-swap SAS hard disk drives (with optional SAS controller), or up to four 2.5-inch simple-swap SAS hard disk drives, or simple-swap SATA hard disk drives, or solid-state hard disk drives, with optional RAID controller.

When it is installed in a 3U chassis, the system-board tray can support up to twelve 3.5-inch hot-swap SAS (with optional SAS controller) or SATA hard disk drives. With the hot-swap feature, you can remove or replace hard disk drives without turning off the dx360 M3 server.

- **Large system-memory capacity**

The dx360 M3 system-board tray supports up to 128 GB of system memory (as of the date of this publication). The memory controller supports up to 16 industry-standard, registered ECC double-data-rate 3 (DDR3) -800, -1066, and -1333 MHz DIMMs, 1.5V RDIMMs or 1.35V capable RDIMMs.

- **Redundant connection**

The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Remote presence capability and blue-screen capture**

The optional virtual media key is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

- **ServeRAID support**

The dx360 M3 system-board tray supports ServeRAID adapters to create redundant array of independent disks (RAID) configurations.

- **Symmetric multiprocessing (SMP)**

The dx360 M3 system-board tray comes with one or two Intel microprocessors. If the system-board tray comes with only one microprocessor, a trained service technician can add a second microprocessor.

- **Systems-management capabilities**

The dx360 M3 system-board tray supports IPMI version 2.0 over LAN systems-management protocol. It supports an optional rack-level management controller that uses industry-standard management tools.

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## Reliability, availability, and serviceability

Three important hardware and software design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the hardware, the availability of the hardware and software when you need it, and the ease with which you can diagnose and correct problems.

The dx360 M3 has the following RAS features:

- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic restart after a power failure, based on the UEFI setting
- Built in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration (depending on server configuration)
- Built-in monitoring of fan, power, temperature, and voltage
- CD-based diagnostic programs
- Customer support center that is available 24 hours a day, 7 days a week<sup>1</sup>
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Hot-swap Serial Attached SCSI (SAS) hard disk drives (some configurations)
- Integrated Ethernet controller
- Integrated management module (IMM)
- Power-on self-test (POST) with error logging of POST failures
- Power management
- 750 watt dual AC input power supplies
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities with failover support
- Remote system problem-determination support
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives (some configurations)
- Simple-swap Serial Attached SCSI (SAS) hard disk drives (some configurations)
- Standby voltage for systems-management features and monitoring
- Startup from backup UEFI page
- System-error LED on the front bezel
- System-error logging
- Upgradeable IMM firmware

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1. Service availability will vary by country. Response time varies; may exclude holidays.

- Upgradeable microcode for POST, UEFI code, and ROM resident code, locally or over a LAN
- Vital product data (VPD); includes firmware revision numbers, stored in nonvolatile memory, for easier remote maintenance

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## IBM Systems Director

IBM Systems Director is a platform-management foundation that streamlines the way you manage physical and virtual systems in a heterogeneous environment. By using industry standards, IBM Systems Director supports multiple operating systems and virtualization technologies in IBM and non-IBM x86 platforms.

Through a single user interface, IBM Systems Director provides consistent views for viewing managed systems, determining how these systems relate to one another, and identifying their statuses, helping to correlate technical resources with business needs. A set of common tasks that are included with IBM Systems Director provides many of the core capabilities that are required for basic management, which means instant out-of-the-box business value. These common tasks include discovery, inventory, configuration, system health, monitoring, updates, event notification, and automation for managed systems.

The IBM Systems Director Web and command-line interfaces provide a consistent interface that is focused on driving these common tasks and capabilities:

- Discovering, navigating, and visualizing systems on the network with the detailed inventory and relationships to the other network resources
- Notifying users of problems that occur on systems and the ability to isolate the sources of the problems
- Notifying users when systems need updates and distributing and installing updates on a schedule
- Analyzing real-time data for systems and setting critical thresholds that notify the administrator of emerging problems
- Configuring settings of a single system and creating a configuration plan that can apply those settings to multiple systems
- Updating installed plug-ins to add new features and functions to the base capabilities
- Managing the life cycles of virtual resources

For more information about IBM Systems Director, see the documentation on the *IBM Systems Director* CD that comes with the server and the IBM xSeries Systems Management Web page at <http://www.ibm.com/systems/management/>, which presents an overview of IBM Systems Management and IBM Systems Director.

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## The UpdateXpress System Packs

The UpdateXpress System Packs provide an effective and simple way to update device drivers, server firmware, and firmware of supported options contained within the server, for System x® and IBM BladeCenter® servers. Each UpdateXpress System Pack contains all the online driver and firmware updates for a specific machine type and operating system combination. The UpdateXpress System Packs are released quarterly. Use the UpdateXpress System Pack Installer to install the current UpdateXpress System Pack for your server.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

You can download the installer and the latest UpdateXpress System Pack for your server from the Web at no additional cost. To download the installer or the latest UpdateXpress System Pack, go to <http://www.ibm.com/systems/support/supportsite.wss/docdisplay?Indocid=SERV-XPRESS&brandind=5000008> or complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Got to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Under **Related downloads**, click **UpdateXpress**.

**Note:** To install the UpdateXpress program, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. See “Firmware updates” on page 74 for additional instructions about using an external USB CD-RW/DVD drive.



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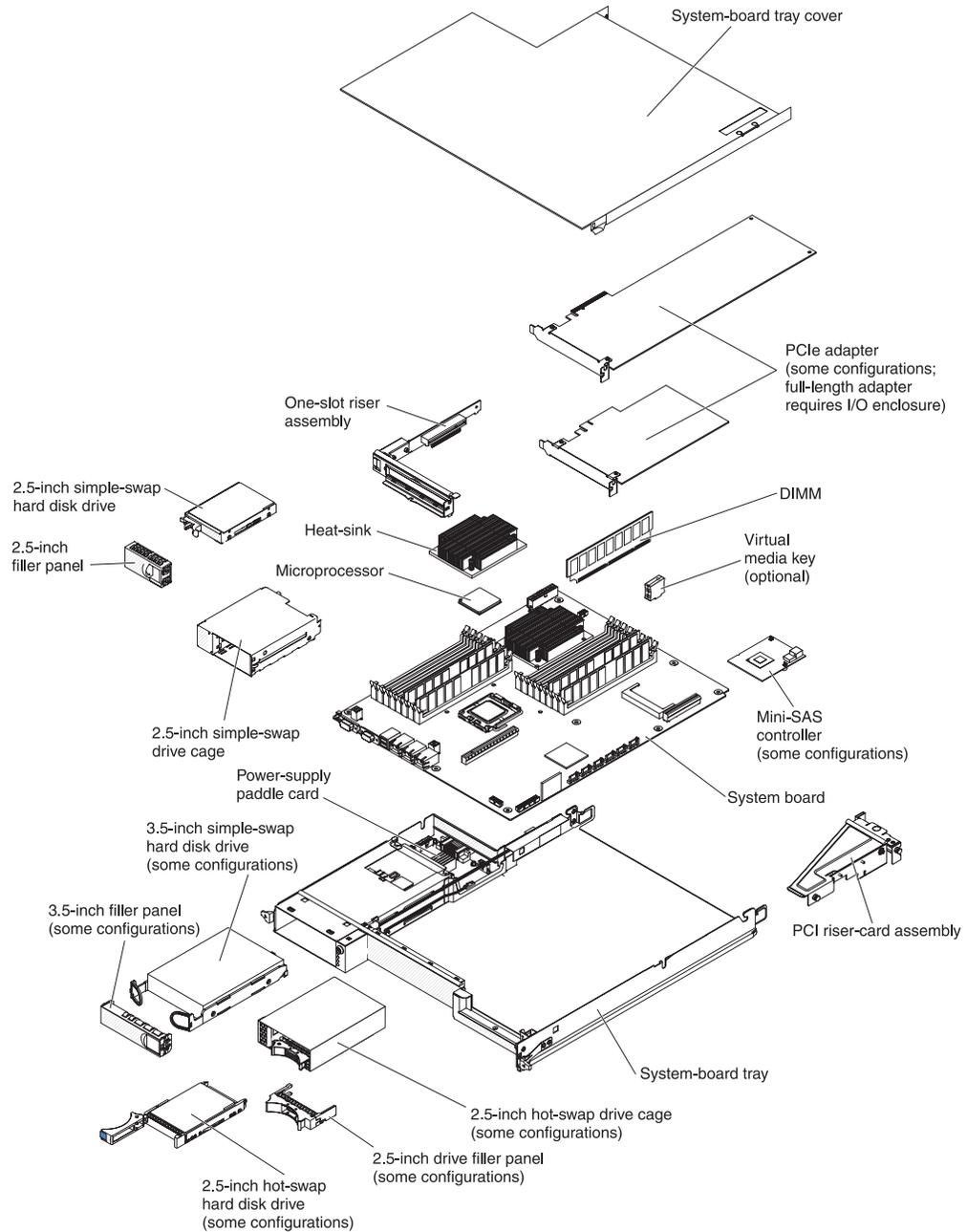
## Chapter 2. Components, features, and controls

This section describes the server components and configurations, the server controls and light-emitting diodes (LEDs), and how to turn the system-board tray on and off.

## System-board tray components

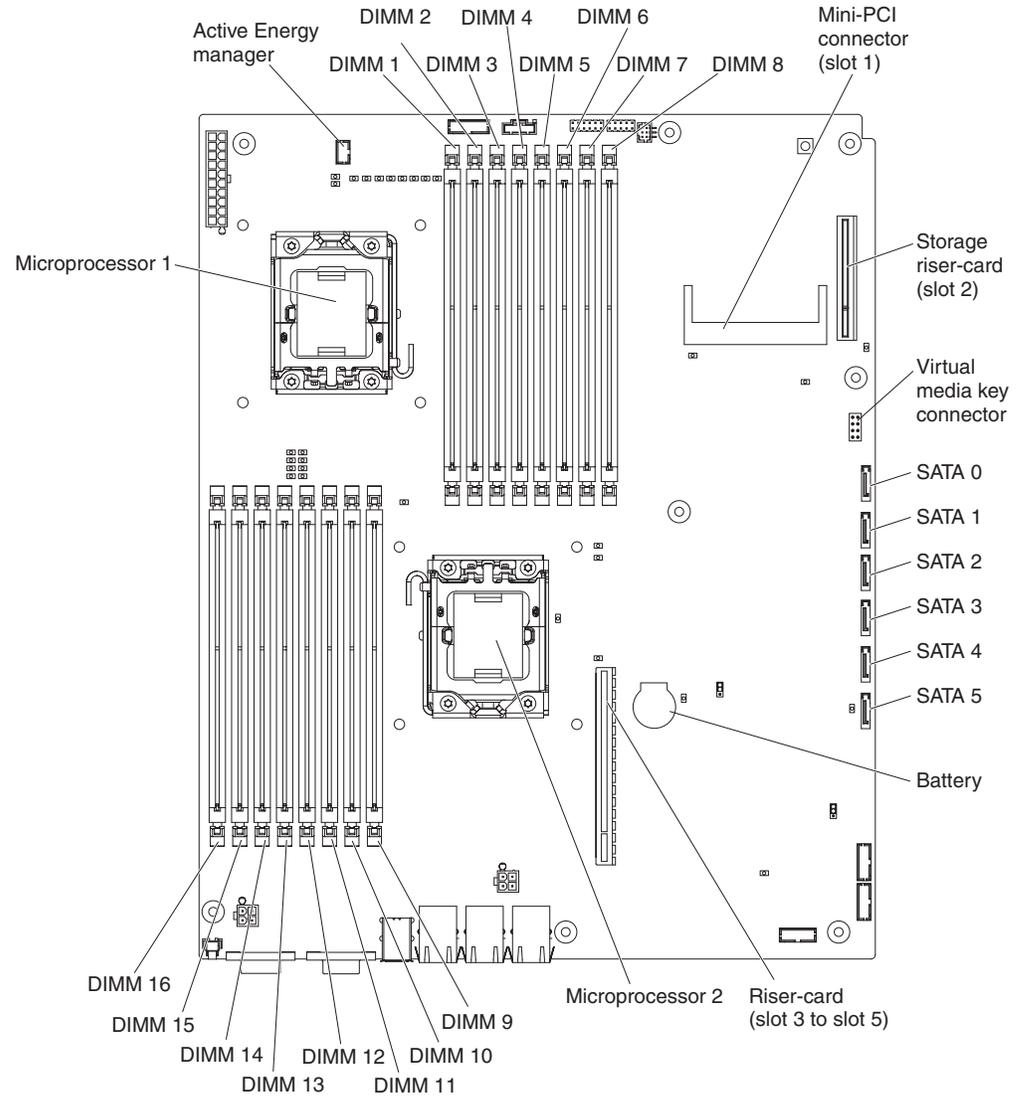
The following illustration shows the major components in the dx360 M3 system-board tray.

**Note:** The illustrations in this document might differ slightly from your hardware.



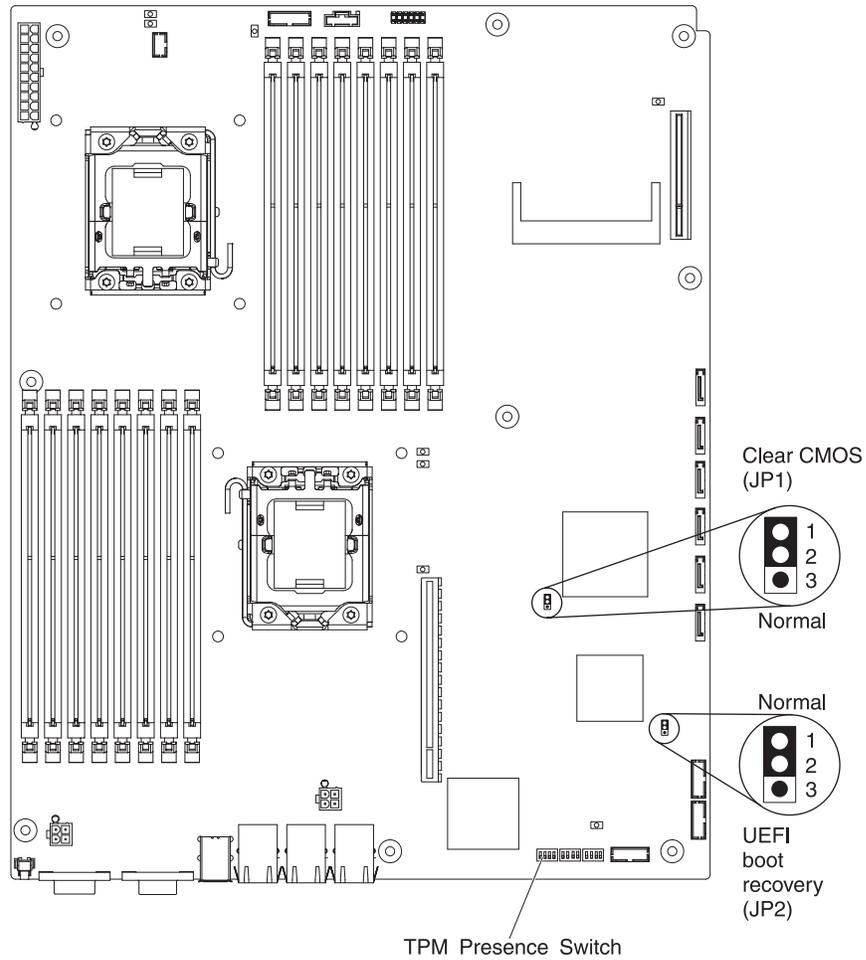
## System-board connectors

The following illustration shows the locations of internal connectors on the system board that are used for installing optional devices. See “Operator panel controls, connectors, LEDs, and power” on page 21 for information about the external connectors. See the *Problem Determination and Service Guide* for information about the other system-board connectors.



## System-board jumpers

The following illustration shows the locations of the jumpers on the system board that relate to selected system functions. See the *Problem Determination and Service Guide* for more information about using jumpers on the system board.

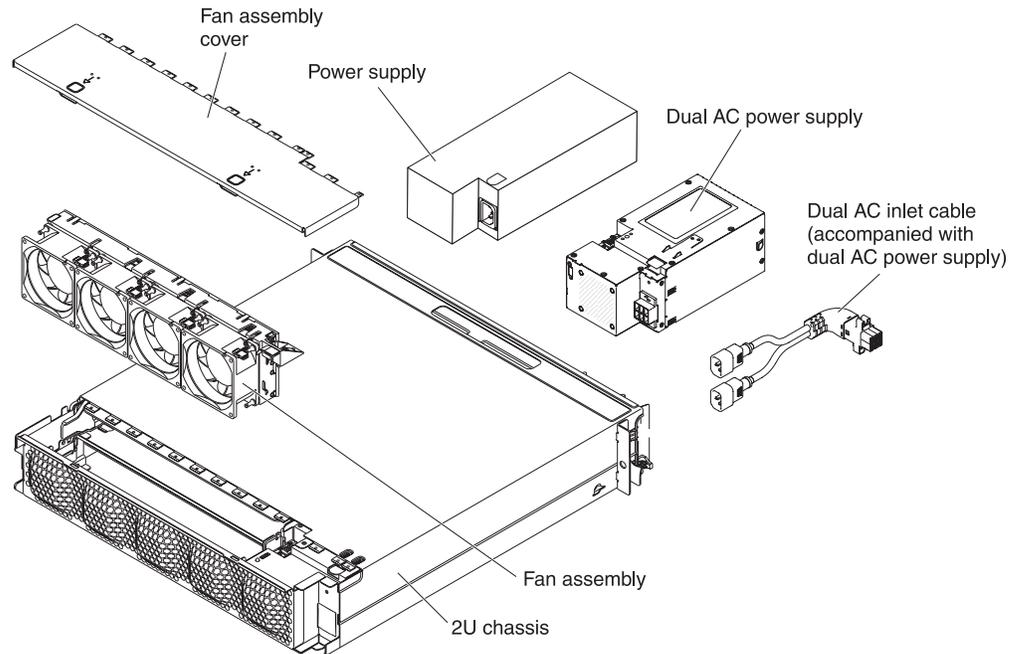


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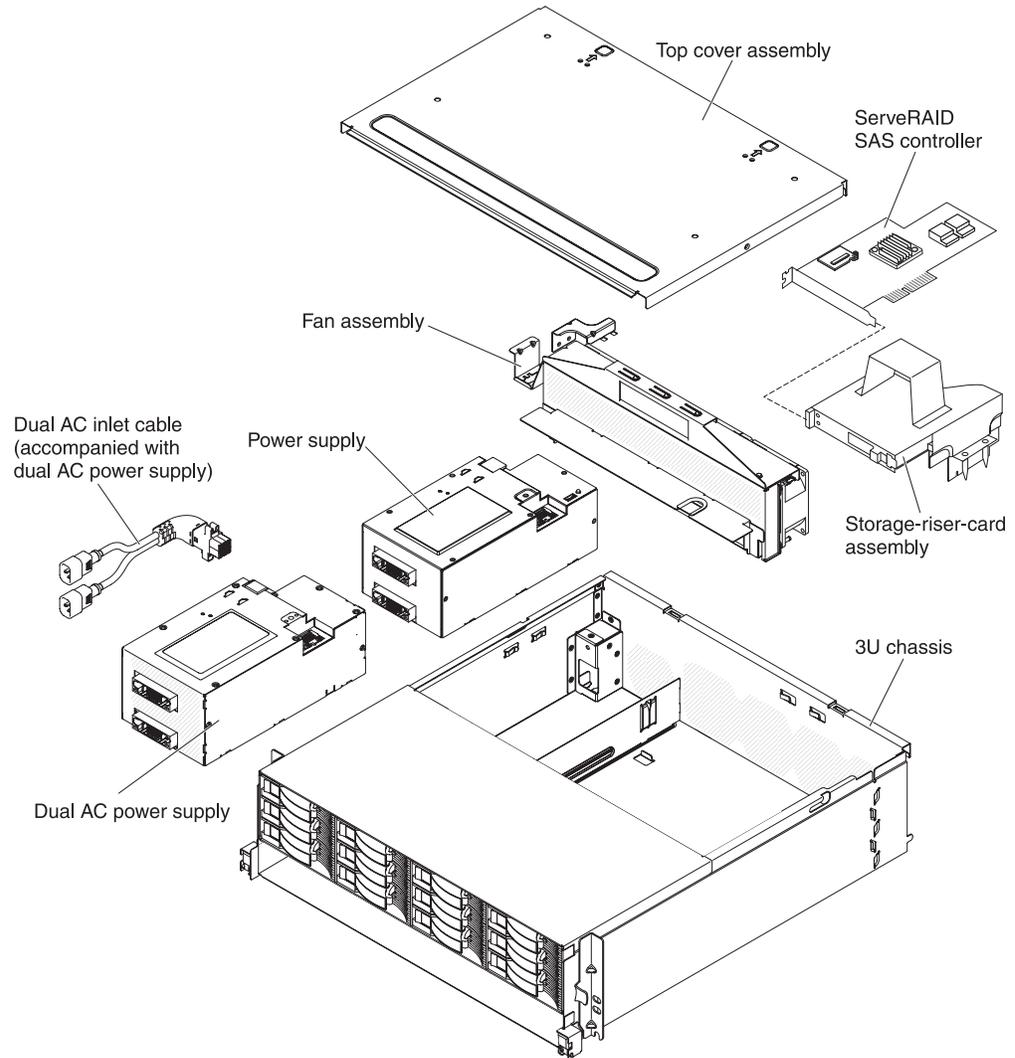
## Flexible chassis features

**Note:** The illustrations in this document might differ slightly from your hardware.

The following illustration shows a 2U chassis. The 2U chassis contains a power supply and a fan assembly that provide operating power and cooling for all components in the chassis. The 2U chassis can support two system-board trays or one system-board tray with an expansion enclosure.



The following illustration shows a 3U chassis. The 3U chassis contains a power supply and a fan assembly that provide operating power and cooling for all components in the chassis. Depending on your server configuration, it also provides support for the installation of up to twelve 3.5-inch hot-swap SAS or SATA hard disk drives (SAS and SATA hard disk drives cannot be used within the same server). The 3U chassis supports one system-board tray that must contain a RAID adapter to control operation of these hard disk drives.



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## Hardware configuration examples

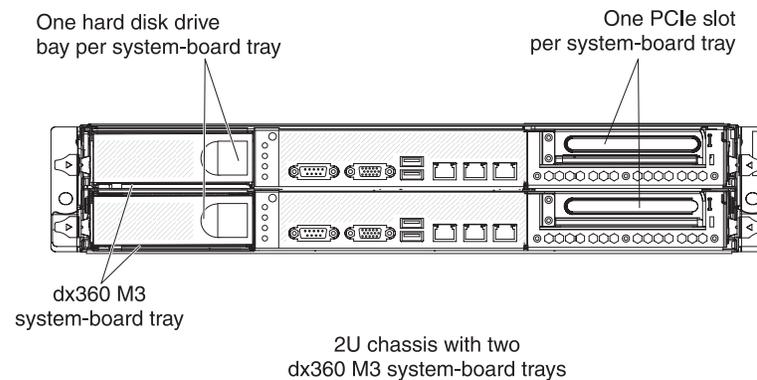
The 2U chassis and 3U chassis support the following iDataPlex dx360 M3 configurations:

- 2U compute server: a 2U chassis that contains two dx360 M3 system-board trays
- 2U input/output server: a 2U chassis that contains one dx360 M3 system-board tray and an optional I/O enclosure
- 2U storage server: a 2U chassis that contains one dx360 M3 system-board tray and an optional storage enclosure
- 3U storage server: a 3U chassis that contains one dx360 M3 system-board tray and integrated storage

**Note:** The illustrations in this document might differ slightly from your hardware.

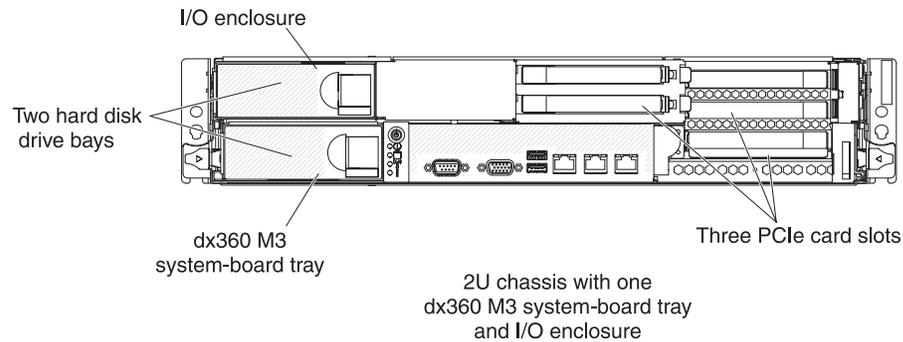
### 2U compute server

The 2U compute server consists of two identical dx360 M3 system-board trays that are installed in a 2U chassis. Each system-board tray has one PCI adapter connector and one 3.5-inch hard disk drive bay that might be configured to hold two 2.5-inch hard disk drives or solid-state drives. The following illustration shows an installed 3.5-inch simple-swap SATA hard disk drive.



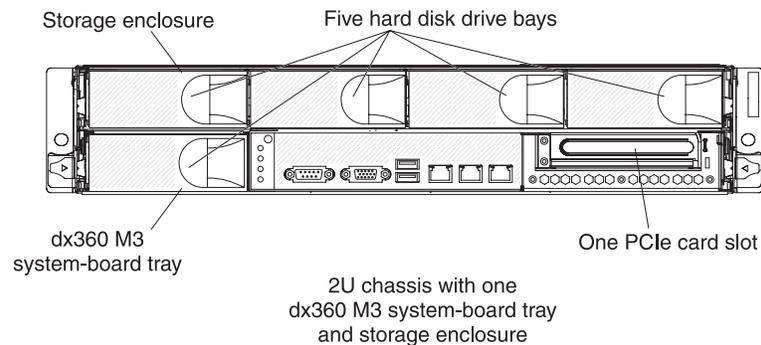
## 2U input/output server

The 2U input/output server consists of one dx360 M3 system-board tray with the I/O enclosure that is installed in a 2U chassis. The I/O enclosure provides one additional 3.5-inch hard disk bay, and three (one is x8 PCIe slot and two are x16 PCIe slots) PCIe slots for the system-board tray. You can configure the 2U input/output server with up to two 3.5-inch hard disk drives or up to four 2.5-inch hard disk drives by using 2.5-inch to 3.5-inch converter kit (some configurations). The following illustration shows two installed 3.5-inch simple-swap SATA hard disk drives.



## 2U storage server

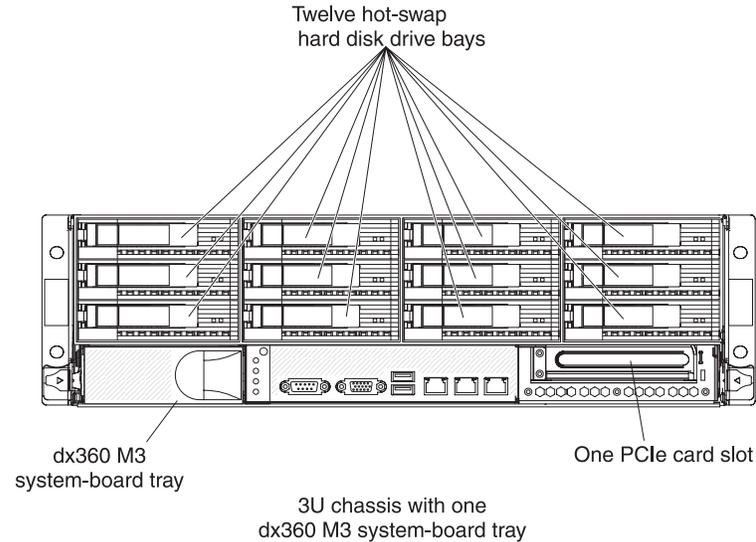
The 2U storage server consists of one dx360 M3 system-board tray with the storage enclosure that is installed in a 2U chassis. The storage enclosure provides four additional 3.5-inch hard disk drive bays for the system-board tray, for a total of five. Depending on the server configuration, you can configure the 2U storage server with up to four SAS/SATA 3.5-inch hard disk drives, up to five SATA 3.5-inch hard disk drives, or up to eight 2.5-inch simple-swap SATA hard disk drives, or SAS hard disk drives, or solid-state hard disk drives by using 2.5-inch to 3.5-inch converter kit. The following illustration shows five installed 3.5-inch simple-swap SATA hard disk drives.



## 3U storage server

The 3U storage server consists of one dx360 M3 system-board tray that is installed in a 3U chassis. Depending on the server configuration, the 3U chassis supports up to twelve 3.5-inch hot-swap SAS or SATA hard disk drives. The following illustration shows twelve installed 3.5-inch hot-swap SAS hard disk drives.

**Note:** The hard disk drive bays in the system-board tray are not used in the 3U storage server configuration.



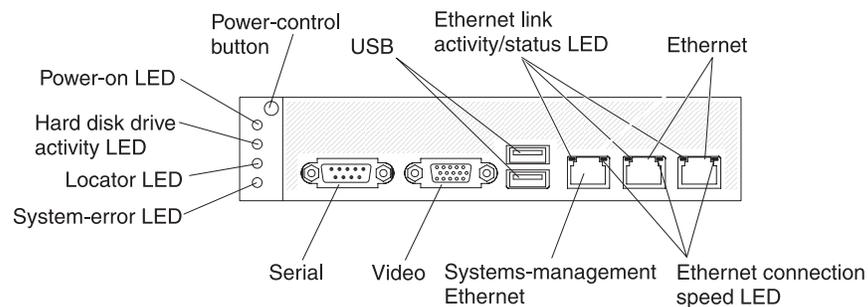
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## Operator panel controls, connectors, LEDs, and power

This section describes the controls, connectors, and light-emitting diodes (LEDs) and how to turn the system-board tray on and off.

### Front view

The following illustration shows the controls, connectors, and LEDs on the front of the server. The operator panel on the system-board tray is the same for all server configurations.



**Power-control button:** Press this button to turn the system-board tray on and off manually or to wake the system-board tray from a reduced-power state. Note that the power-control button is recessed to prevent the system-board tray from being turned on or off accidentally. There is a power-control button cover that can be removed for easier access to the power-control button.

**USB connectors:** Connect USB 2.0 devices to these connectors.

**Ethernet link activity/status LED:** This LED is on each Ethernet connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port. When this LED is flashing, it indicates that there is activity between the server and the network.

**Ethernet connectors:** Use these connectors to connect the server to a network.

**Ethernet connection speed LED:** This LED is on each Ethernet connector. The status of this LED indicates the connection speed, in megabits-per-second (Mbps), between the server and the network as follows:

- LED off: 10 Mbps connection
- LED lit amber: 100 Mbps connection
- LED lit green: 1000 Mbps connection

**Systems-management Ethernet connector:** Use this connector to connect the server to a network for systems-management information control.

**Video connector:** Connect a monitor to this connector.

**Serial connector:** Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module (IMM). The IMM can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).

**System-error LED:** When this LED is lit, it indicates that a system error has occurred. The source of the error is logged in the system-event log that is accessed in the Setup utility.

**Locator LED:** This LED can be lit remotely by the system administrator to aid in visually locating the system-board tray. In an IPMI environment, the system administrator can light the LED by using the IPMI **chassis identify** command.

**Hard disk drive activity LED:** When this LED is lit or flashing, it indicates that an associated hard disk drive is in use.

In configurations that contain hot-swap hard disk drives, each hot-swap hard disk drive has the following LEDs.

- **Hot-swap hard disk drive activity LED:** When this LED is flashing, it indicates that the drive is in use.
- **Hot-swap hard disk drive status LED:** When this LED is lit, it indicates that the drive has failed.

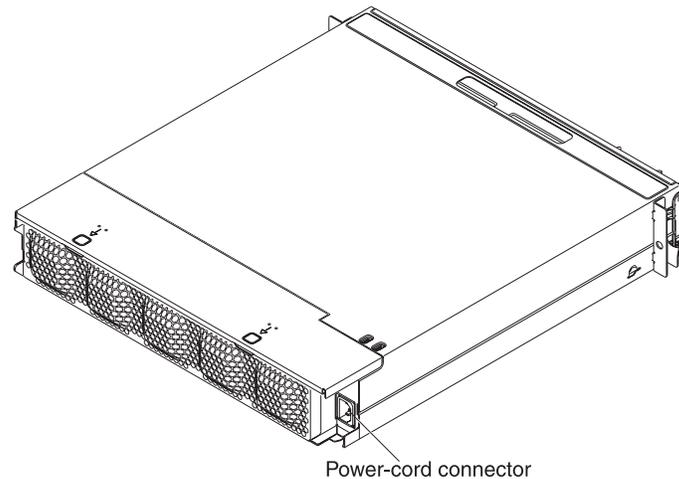
**Power-on LED:** The states of the power-on LED are as follows:

- **Off:** AC power is not present, or the power supply or the LED itself has failed.
- **Flashing rapidly (4 times per second):** The system-board tray is turned off and is not ready to be turned on. The power-control button is disabled.
- **Flashing slowly (once per second):** The system-board tray is turned off and is ready to be turned on. You can press the power-control button to turn on the system-board tray.
- **Lit:** The system-board tray is turned on.
- **Fading on and off:** The system-board tray is in a reduced-power state. To wake the system-board tray, press the power-control button or use the IMM Web interface.

**Note:** If this LED is off, it does not mean that no electrical power is present. The LED might be burned out. To remove all electrical power, you must remove the system-board tray from the chassis, remove the chassis from the rack, or disconnect the power cord from the power source.

## Rear view

The following illustration shows the connector on the rear of the 2U chassis, the 3U chassis is similar.



**Power-cord connector:** Connect the power cord to this connector. When the chassis is installed in an iDataPlex rack, it is automatically connected to power through a power cord that is mounted to the rack rail.

---

## Turning on the system-board tray

After you install the system-board tray in a chassis, the system-board tray can start in any of the following ways.

**Important:** To avoid potential problems during startup, disconnect any USB flash drives from the system that contain the Smart Launch Utility before you turn on the system-board tray.

- You can press the power-control button on the front of the system-board tray (see “Operator panel controls, connectors, LEDs, and power” on page 21) to start the system-board tray.
- In an IPMI environment, the system administrator can turn on the system-board tray by using the IPMI **chassis control** command.
- If a power failure occurs, the system-board tray can start automatically when power is restored, if it is configured to do so.

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## Turning off the system-board tray

When you turn off the system-board tray, it is still connected to ac power through the chassis power supply. The system-board tray still can respond to requests from the IMM, such as a remote request to turn on the system-board tray. To remove all power from the system-board tray, you must remove the tray from the chassis.

Shut down the operating system before you turn off the system-board tray. See the operating-system documentation for information about shutting down the operating system.

The system-board tray can be turned off in any of the following ways:

- You can press the power-control button on the front of the system-board tray (see “Operator panel controls, connectors, LEDs, and power” on page 21). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.
- You can turn off the system-board tray from the operating system, if the operating system supports this feature. After an orderly shutdown of the operating system, the system-board tray will be turned off automatically.
- In an IPMI environment, the system administrator can turn off the system-board tray by using the IPMI **chassis control** command.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the system-board tray.
- You might be able to turn off the system-board tray by using an optional management appliance.
  - If the system is not operating correctly, the management appliance might automatically turn off the system-board tray.
  - Through the management appliance control interface, you might also be able to configure the management appliance to turn off the system-board tray. For additional information, see the documentation for your management appliance.

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## Chapter 3. Installing optional devices

This section provides detailed instructions for installing optional hardware devices.

In addition to the instructions in this chapter for installing optional hardware devices, updating firmware and device drivers, and completing the installation, IBM Business Partners must also complete the steps in “Instructions for IBM Business Partners.”

**Important:** To help ensure that the devices that you install work correctly and do not introduce problems, observe the following precautions:

1. Make sure that the server and the installed firmware levels support the devices that you are installing. If necessary, update the UEFI and IMM firmware and any other firmware that is stored on the system boards. For information about where firmware is stored in the server, see Chapter 6, “Configuration information and instructions,” in the *Problem Determination and Service Guide*. For a list of supported optional devices for the server, see <http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/>.
2. Before you install optional hardware devices, make sure that the server is working correctly. Start the server and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for information about how to run diagnostics.
3. Follow the installation procedures in this chapter and use the correct tools. Incorrectly installed devices can cause system failures because of damaged pins in sockets or connectors, loose cabling, or loose components.
4. Use the best practices to apply current firmware and device-driver updates for the server and optional devices. To download the *IBM System x Firmware Update Best Practices* document, go to <http://www.ibm.com/support/entry/portal/docdisplay?brand=50000020&Indocid=MIGR-5082923>. Additional hints and tips are available from the following sites:
  - IBM support: <http://www.ibm.com/supportportal/>
  - System x configuration tools: <http://www.ibm.com/systems/x/hardware/configtools.html>

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### Instructions for IBM Business Partners

In addition to the instructions in this chapter for installing optional hardware devices, updating firmware and device drivers, and completing the installation, IBM Business Partners must also complete the following steps:

1. Before you configure a server for a customer, complete the Solution Assurance checklist at <http://w3.ibm.com/support/assure/assur30i.nsf/webindex/sa294/>.
2. After you have confirmed that the server starts correctly and recognizes the newly installed devices and that no error LEDs are lit, run the Dynamic System Analysis (DSA) stress tests. For information about using DSA, see the *Problem Determination and Service Guide*.
3. Shut down and restart the server multiple times to ensure that the server is correctly configured and functions correctly with the newly installed devices.
4. Save the DSA log as a file and send it to IBM.
5. To ship the server, repackage it in the original undamaged packing material and observe IBM procedures for shipping.

## Installation guidelines

### Attention:

- Static electricity that is released to internal server components when the server is powered-on might cause the system to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when removing or installing a hot-swap device.
- This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, neither to be used in Public Services Network.

Before you install optional devices, read the following information:

- Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 27. This information will help you work safely.
- Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that an error message is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver and a small Phillips screwdriver available.
- You do not have to turn off the system-board tray to install or replace hot-swap drives or hot-plug Universal Serial Bus (USB) devices. However, you must shut down the operating system and turn off the system-board tray before you remove the system-board tray from a chassis or before you install simple-swap hard disk drives.
- Blue on a component indicates touch points, where you can grip the component to remove or install it, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

## System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a hot-swap drive within 2 minutes of removal.
- The system-board tray battery is operational. If the battery becomes defective, replace it immediately.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.
- You have replaced one or both system-board trays within 2 minutes of removal.
- For a 2U compute server, do not operate the upper system-board tray with the lower system-board tray removed or powered off, except for servicing.

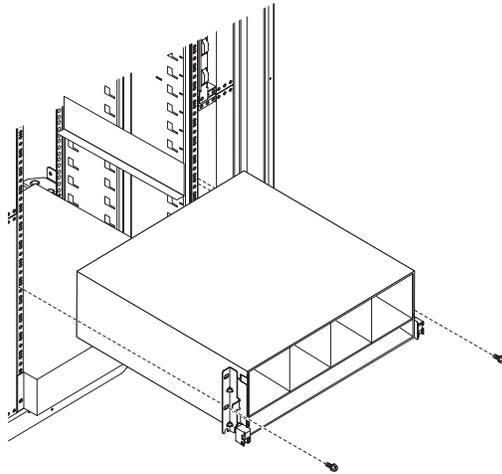
## Handling static-sensitive devices

**Attention:** Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal surface on the outside of the rack, chassis, or system-board tray for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the system-board tray or enclosure without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the system-board tray cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

## Removing a 3U chassis from an iDataPlex rack



To remove a 3U chassis from an iDataPlex rack, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the server and all attached devices (see “Turning off the system-board tray” on page 23).
3. If external cables are connected to the front of the system-board tray, note where they are connected; then, remove them.

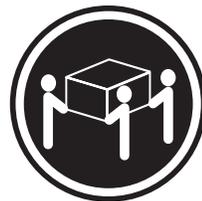
**Attention:** When you use RAID arrays, hard disk drives must be installed in the same location from which they were removed.

4. Note where the hard disk drives are installed; then, remove them (see “Removing a hard disk drive” on page 33).

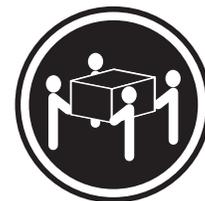
### Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

**CAUTION:**  
Use safe practices when lifting.

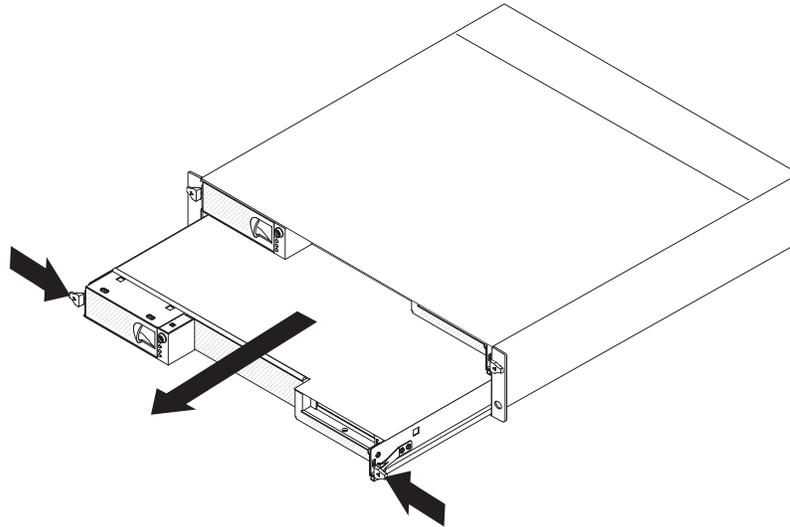
5. Remove the 2 screws and slide the 3U chassis from the iDataPlex rack.
6. Set the 3U chassis on a flat, static-protective surface.

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## Removing a system-board tray from a 2U chassis

### Notes:

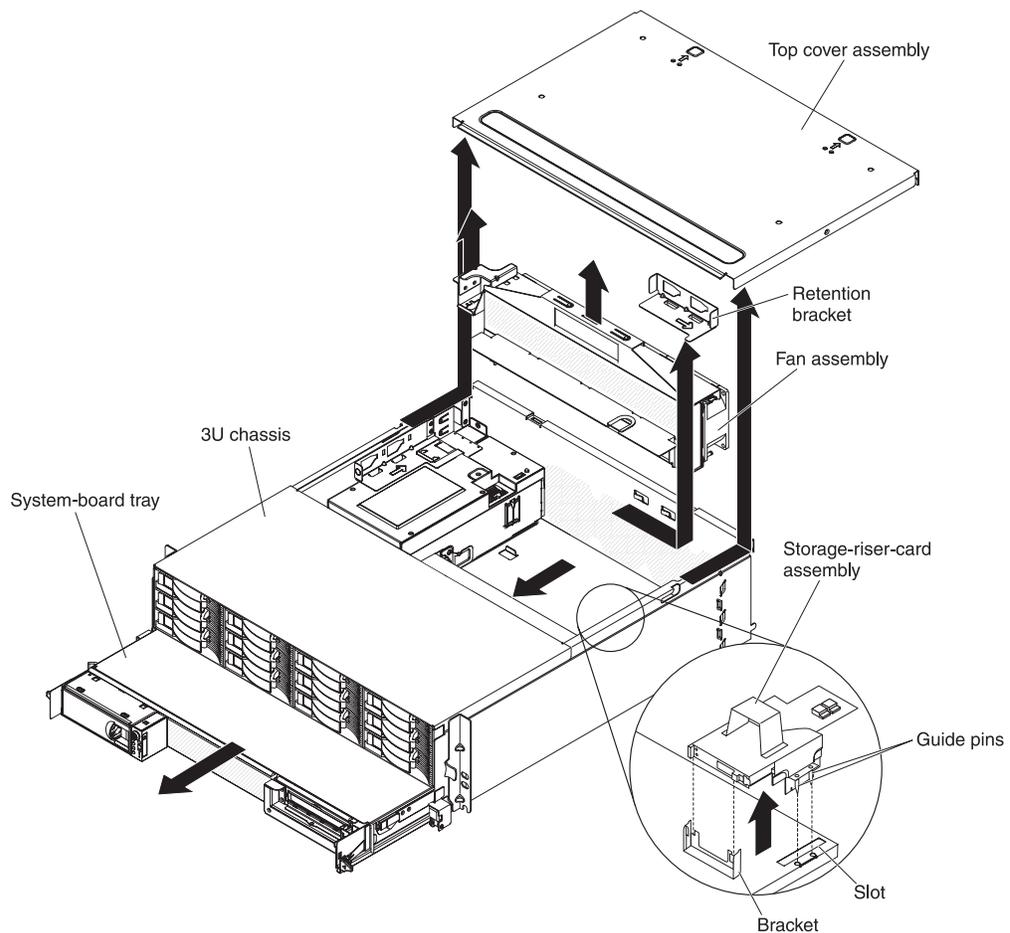
1. If two system-board trays are installed in the chassis, they can be removed independently of each other.
2. If an expansion enclosure is installed on the system-board tray, you will remove the expansion enclosure and the system-board tray from the chassis as one assembly.



To remove a system-board tray from a 2U chassis, complete the following steps:

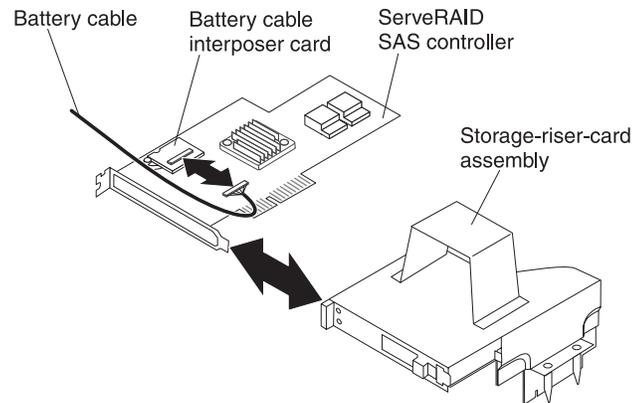
1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If external cables are connected to the front of the system-board tray or expansion enclosure, note where they are connected; then, remove them.
4. Press in on the two release handles, pull the system-board tray and expansion enclosure, if one is attached, out of the 2U chassis, and set it on a flat, static-protective surface.

## Removing a system-board tray from a 3U chassis



To remove a system-board tray from a 3U chassis, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the server and all attached devices (see “Turning off the system-board tray” on page 23).
3. If external cables are connected to the front of the system-board tray, note where they are connected; then, remove them.
4. Remove the 3U chassis from the iDataPlex rack (see “Removing a 3U chassis from an iDataPlex rack” on page 28).
5. Press on the two release latches at the top-rear edge of the top-cover assembly; then, slide the top-cover assembly toward the rear of the 3U chassis and remove it.
6. Note the signal cable routing and connection locations; then, disconnect the signal cables from the assembly.  
**Attention:** When you move the storage-riser-card assembly, do not allow it to touch any components or structures inside the 3U chassis.
7. Lift up on the storage-riser-card assembly.

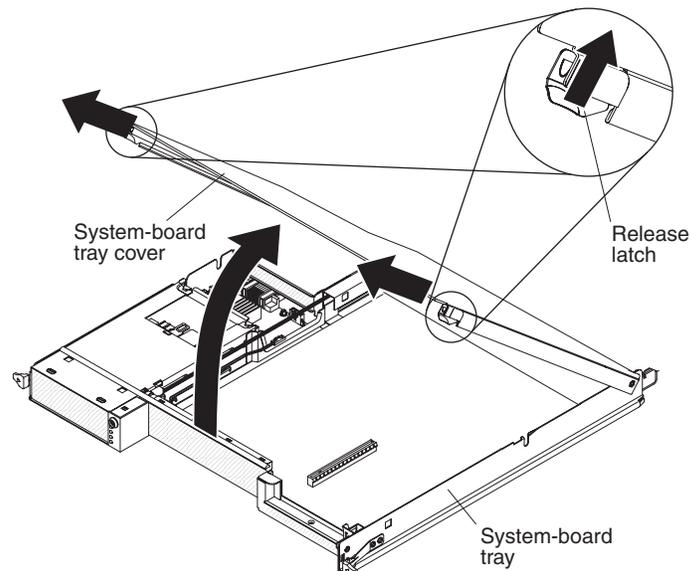


8. Turn the storage-riser-card assembly to access the ServeRAID SAS controller.
9. Pull the controller from the connector on the storage-riser-card assembly.
10. Disconnect the battery cable from the battery cable interposer card.
11. Remove the storage-riser-card assembly and ServeRAID SAS controller from the 3U chassis.
12. Slide and release the retention bracket that secures the fan assembly, and remove the bracket from the chassis.
13. Lift up on both fan-assembly handles and remove the fans from the 3U chassis.
14. Note the cable routing and connection locations; then, disconnect the cables that connect the system-board tray to the 3U chassis.
15. Push on the back edge of the system-board tray from inside the 3U chassis and slide the system-board tray forward.
16. Pull the system-board tray out of the 3U chassis and set it on a flat, static-protective surface.

---

## Removing the system-board tray cover

**Note:** If an expansion enclosure is installed on the system-board tray, remove it instead (see “Removing an expansion enclosure” on page 32).



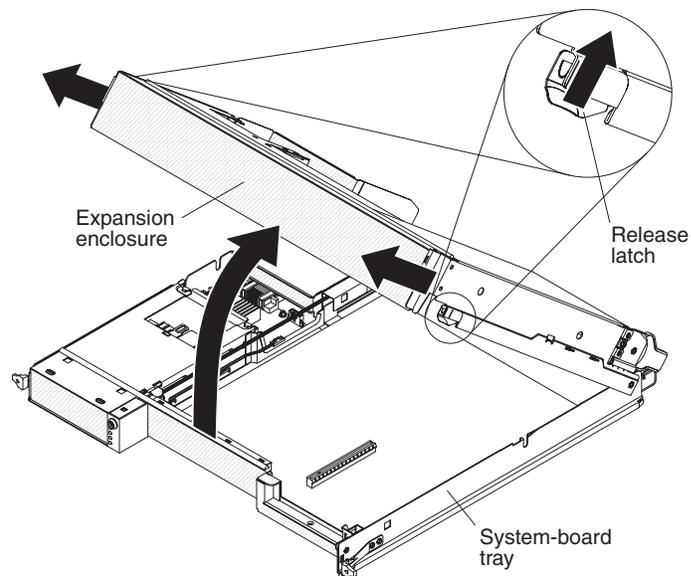
To remove the system-board tray cover, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).
4. Carefully set the system-board tray on a flat, static-protective surface, with the cover side up.
5. Pull the cover release on each side of the system-board tray outward; then, lift the cover open.
6. Lift the cover off the system-board tray and store it for future use.

**Note:** If two system-board trays are installed in a 2U chassis, covers must be installed on both of them.

---

## Removing an expansion enclosure



To remove an expansion enclosure, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29).
4. Carefully set the system-board tray on a flat, static-protective surface.
5. If you are removing the enclosure, note the cable routing and connection locations; then, disconnect the cables that connect the expansion enclosure to the system-board tray.
6. Pull the expansion-unit release on each side of the system-board tray outward; then, rotate the expansion enclosure open.

- Using care not to pull on the cables, lift the expansion enclosure from the system-board tray and carefully set it upside down behind the system-board tray on a flat, static-protective surface.

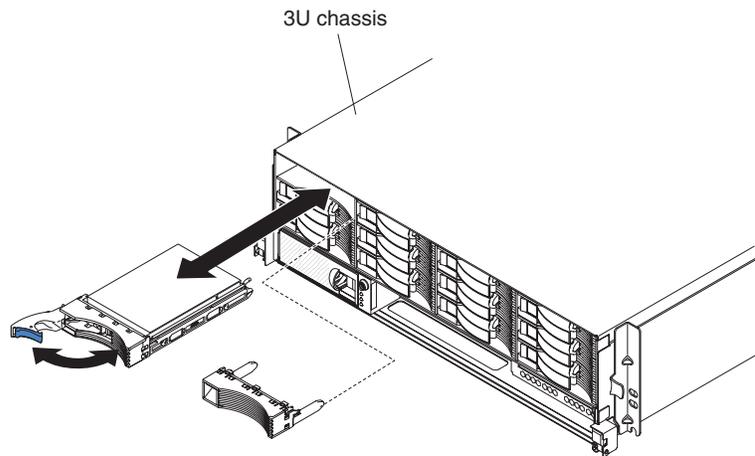
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## Removing a hard disk drive

The dx360 M3 server configurations support installation of four hard disk drive types. The following sections describe the removal of each type of hard disk drive.

### Removing a 3.5-inch hot-swap hard disk drive

**Note:** The following illustration shows how to remove a 3.5-inch hot-swap hard disk drive from a 3U chassis.



**Note:** You do not have to turn off the server to remove a hot-swap drive.

To remove a hot-swap hard disk drive, complete the following steps:

- Read the safety information that begins on page vii and “Installation guidelines” on page 26.
- Rotate the drive tray handle to the open position.
- Grasp the handle; then, pull the drive out of the drive bay.

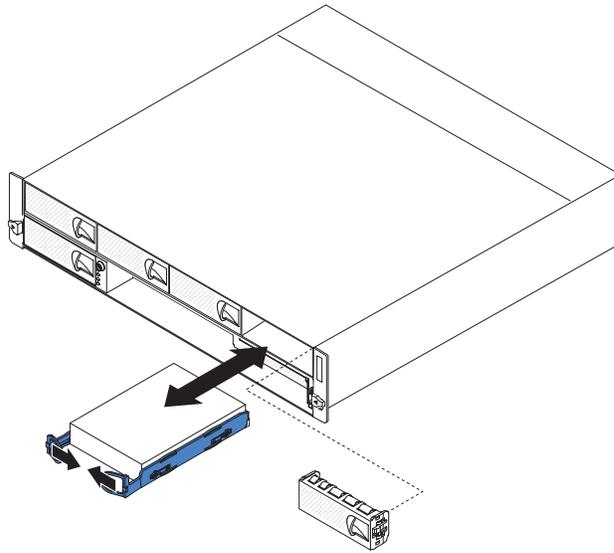
**Note:** A hard disk drive or filler panel must always be installed in each drive bay when the server is turned on.

- Store the drive for later use.

**Note:** If you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

### Removing a 3.5-inch simple-swap hard disk drive

**Note:** The following illustration shows how to remove a 3.5-inch simple-swap hard disk drive from a 2U chassis.



To remove a simple-swap hard disk drive, complete the following steps:

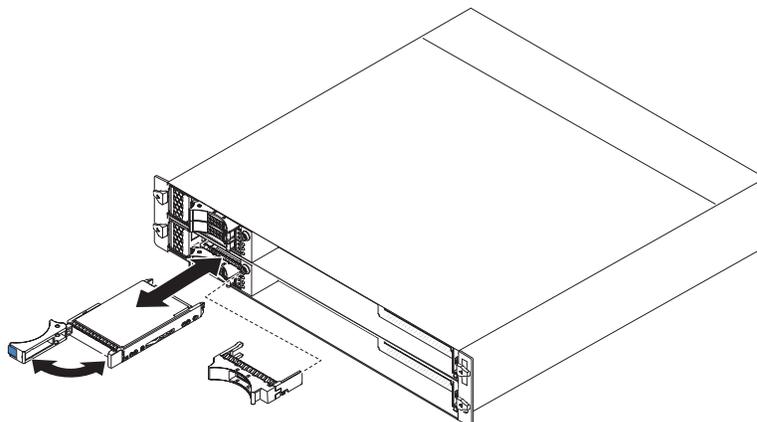
1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. Remove the filler panel from the bay that contains the simple-swap hard disk drive.
4. Pull the loops of the drive toward each other; then, pull the drive out of the drive bay.

**Note:** A hard disk drive or filler panel must always be installed in each drive bay when the server is turned on. In each drive bay that contains a simple-swap hard disk drive, a filler panel must always be installed in addition to the drive.

5. Store the drive and filler panel for later use.

## Removing a 2.5-inch hot-swap hard disk drive

**Note:** The following illustration shows how to remove a 2.5-inch hot-swap hard disk drive from a 2U chassis.



**Note:** You do not have to turn off the server to remove a hot-swap drive.

To remove a 2.5-inch hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Rotate the drive tray handle to the open position.
3. Grasp the handle; then, pull the drive out of the drive bay.

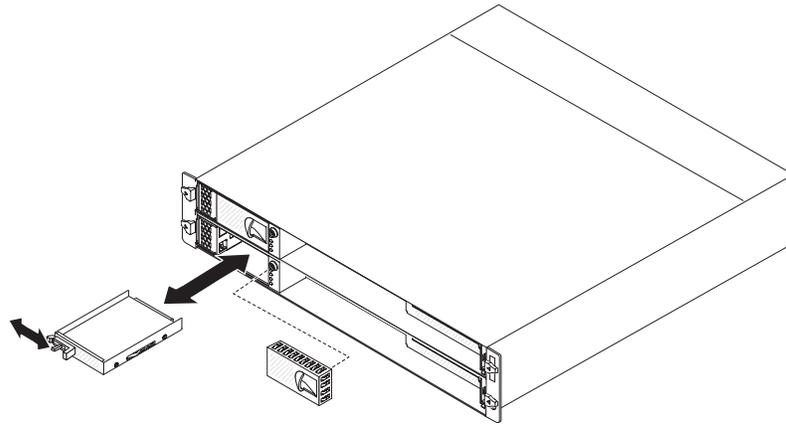
**Note:** A hard disk drive or filler panel must always be installed in each drive bay when the server is turned on.

4. Store the drive for later use.

**Note:** If you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

## Removing a 2.5-inch simple-swap hard disk drive or solid-state drive

**Note:** The following illustration shows how to remove a 2.5-inch simple-swap hard disk drive or solid-state drive from a 2U chassis.



To remove a 2.5-inch simple-swap hard disk drive or solid-state drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. Remove the filler panel from the bay that contains the simple-swap hard disk drive.
4. Slide the retention tab; then, pull the drive out of the drive bay.

**Note:** A drive or filler panel must always be installed in each drive bay when the server is turned on. In each drive bay that contains a simple-swap hard disk drive or solid-state drive, a filler panel must always be installed in addition to the drive.

5. Store the drive for later use.

---

## Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter:

- To ensure that an adapter works correctly in your UEFI-based server, make sure that the adapter firmware is at the latest level.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

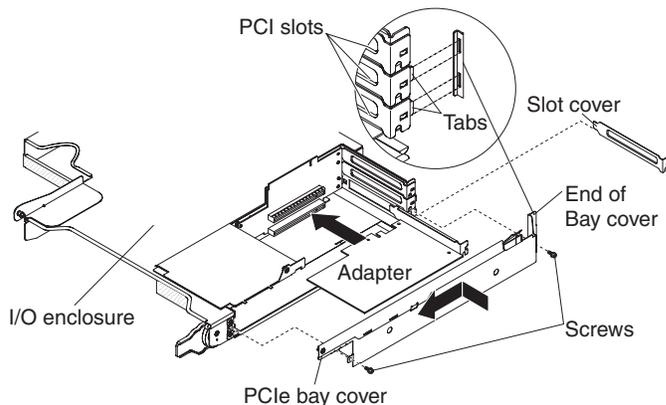
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you have to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server supports the following riser cards for optional adapters:
  - One-slot riser card: PCIe x16 (x16) adapters
  - Three-slot riser card: one PCIe x8 (x8) adapters with two PCIe x16 (x16) adapters
- Do not install the NVIDIA Grid Kx/Mxx, the NVIDIA Quadro Kxxxx or the NVIDIA Tesla Kxx adapter options in systems containing 1 TB of system memory or more. If these options are installed in systems with 1 TB of memory or more, it might cause undetected data corruption and system instability. These options are only supported in systems containing less than 1 TB of memory. For more information, see RETAIN tip H213010 at <http://www.ibm.com/support/entry/myportal/docdisplay?Indocid=migr-5096047>.
- In configurations that have a three-slot, the server scans the PCIe adapters to assign system resources, following the boot sequence that is set in the Setup utility.

**Important:** The maximum power consumption from all supply voltages for a single PCIe slot is the same as specified in PCI Local Bus Specification Revision 2.3 for conventional slots.

**Note:** All Graphics Processing Unit (GPU) adapters installed in the server must be the same. They must be identical in brand and type. When you install additional GPUs, make sure you purchase GPUs with the same product part number as shown on the existing GPUs in the server.

## Installing an outer adapter in the I/O enclosure

**Note:** The PCI riser card is part of an optional expansion enclosure; the riser card and adapters are attached to the expansion enclosure. This procedure assumes that an expansion enclosure is already installed on the system-board tray.

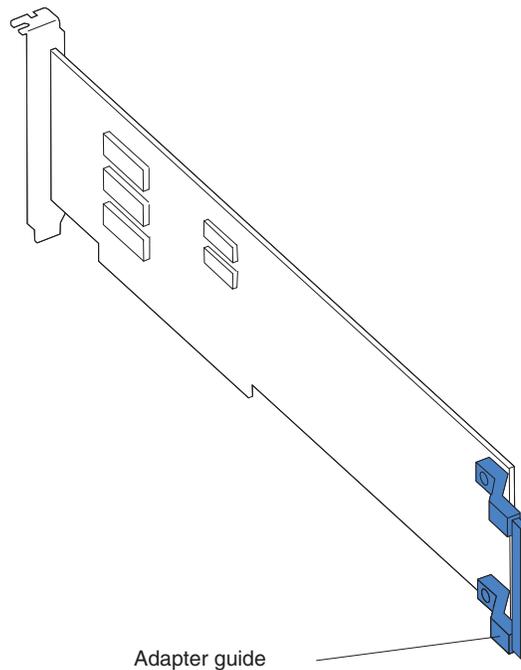


To install an outer adapter in a PCI riser card, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29).
4. Remove the expansion enclosure (see “Removing an expansion enclosure” on page 32) and set it upside down on a flat, static-protective surface.

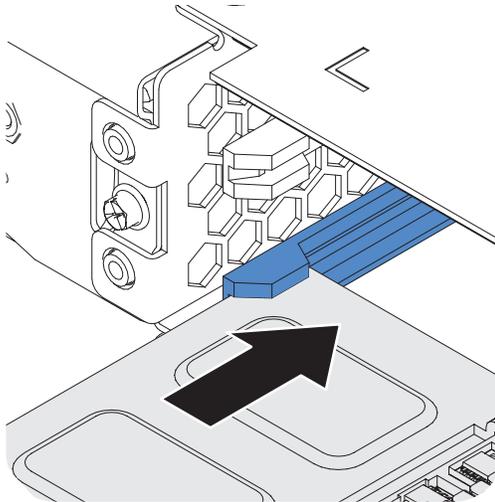
**Note:** If an adapter is already installed in the riser card, the riser card and adapter are removed together.

5. Remove the screws, slide the PCIe adapter bay cover toward the front of the expansion enclosure, and remove it. Save the screws and the PCIe adapter bay cover for later use.
6. If an adapter is installed in the connector on the riser card where you are installing the new adapter, remove it.
7. Touch the static-protective package that contains the adapter that you are installing to any *unpainted* metal surface on the chassis or rack; then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
8. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



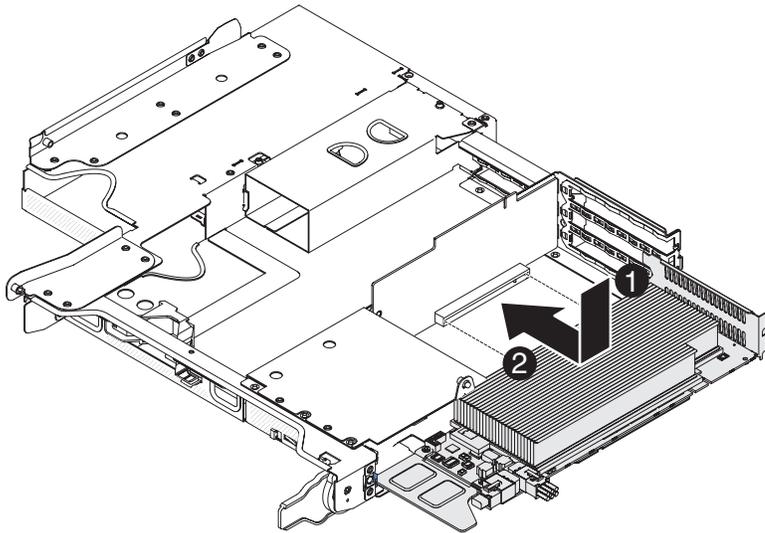
9. Follow the instructions that come with the adapter to set any jumpers or switches.
10. Carefully grasp the adapter by the top edge or upper corner, and slide it halfway into PCIe bay.

**Note:** If the adapter is a full-length adapter, or with a full-length extender, make sure it is seated in the groove of retainer bracket.

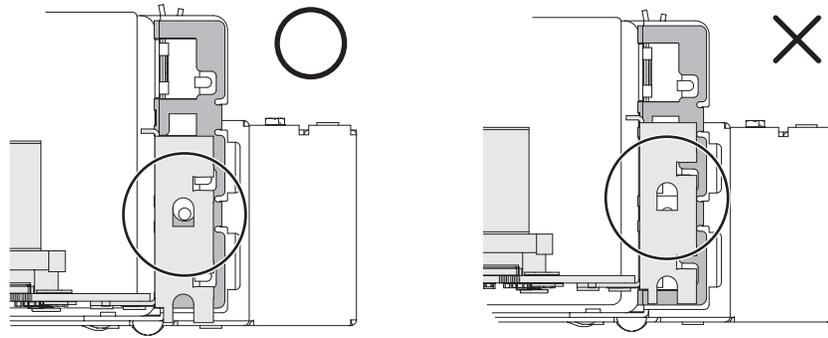


11. If any cables must be connected to an adapter, connect them. Route these cables through the hole at the side of the expansion enclosure.
12. Align the adapter with PCIe slot on the riser-card; then press the adapter into the slot.

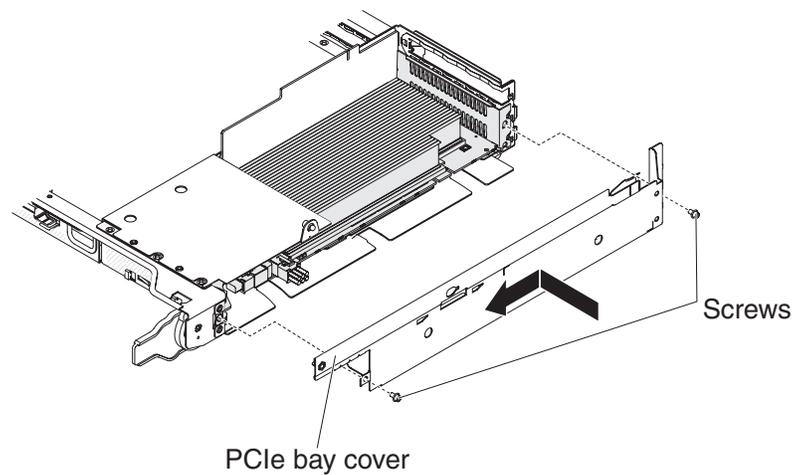
**Note:** For dual-slot PCI adapter, press the adapter down and forward until the gold fingers stop at the slot on the riser card. Make sure the edge of the I/O bracket meets the chassis bottom. Do not lift the card during this step.



Push the card gently into the slot. Make sure that the screw holes on the card and the chassis are aligned.



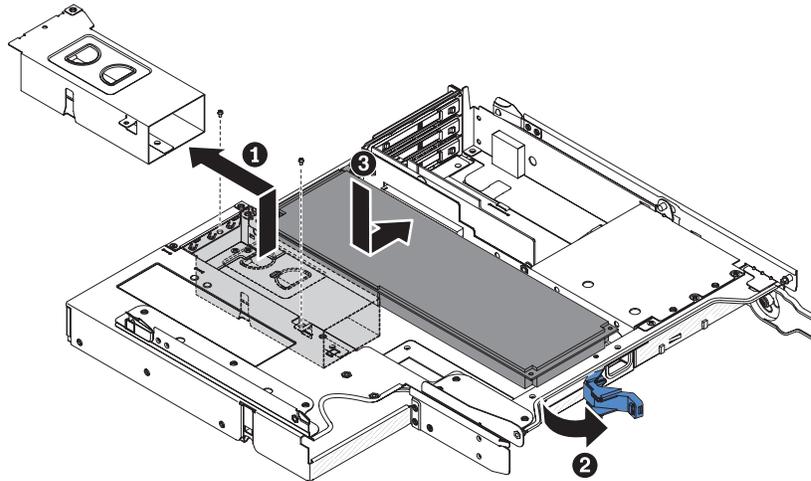
13. If you have another adapter to install, do so now. Otherwise, continue with step 11 on page 38.
14. Align the tabs on the PCIe adapter bay cover with the holes on the expansion enclosure; then, slide the PCIe adapter bay cover toward the rear of the expansion enclosure until it stops.
15. Install the PCIe adapter bay cover screws.



If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 53.

## Installing an inner adapter in the I/O enclosure (some configurations)

To install an inner PCIe adapter in the I/O enclosure, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29).
4. Remove the expansion enclosure (see “Removing an expansion enclosure” on page 32) and set it upside down on a flat, static-protective surface.

**Note:** If an adapter is already installed in the riser card, the riser card and adapter are removed together.

5. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the outside of the system-board tray; then, remove the adapter from the package. Avoid touching the components and gold-edge connectors on the adapter.
6. See the documentation that comes with the adapter to determine whether you must set any jumpers or switches.
7. Remove the screws and remove the bracket from the I/O enclosure and save it for future use.
8. Release and open the latch on the back of the I/O enclosure to make the space for installing the adapter.
9. Align the adapter with the PCIe slot on the riser-card assembly; then, press the adapter into the slot.

**Note:** If the adapter is a full-length adapter, or with a full-length extender, make sure it is seated in the groove of retainer bracket.

10. Make sure the cables are routed appropriately and close the latch on the back of the I/O enclosure.
11. Install the bracket in the I/O enclosure and tighten the screws.
12. If you have another adapter to install, do so now. Otherwise, continue with the next step.

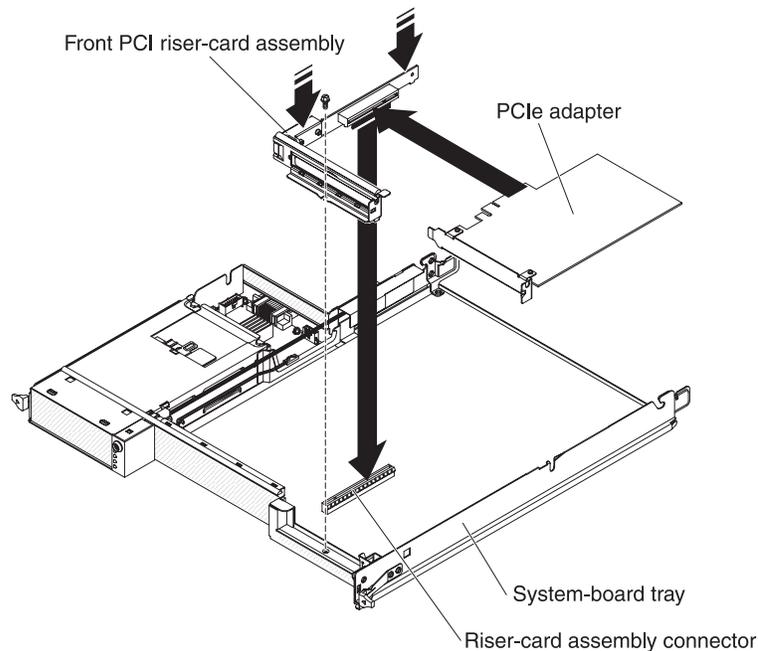
**Note:** To complete the installation of the PCIe adapter, see the documentation that comes with the adapter for device-driver and configuration information.

13. If any cables must be connected to an adapter, connect them. Route these cables through the hole at the side of the expansion enclosure.
14. Align the tabs on the PCIe adapter bay cover with the holes on the expansion enclosure; then, slide the PCIe adapter bay cover toward the rear of the expansion enclosure until it stops.
15. Install the PCIe adapter bay cover screws.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 53.

## Installing an adapter to a front PCI riser-card assembly

**Note:** The front PCI riser-card assembly supports installation of only half-length, full-height adapters.



To install an adapter to a front PCI riser-card assembly, complete the following steps:

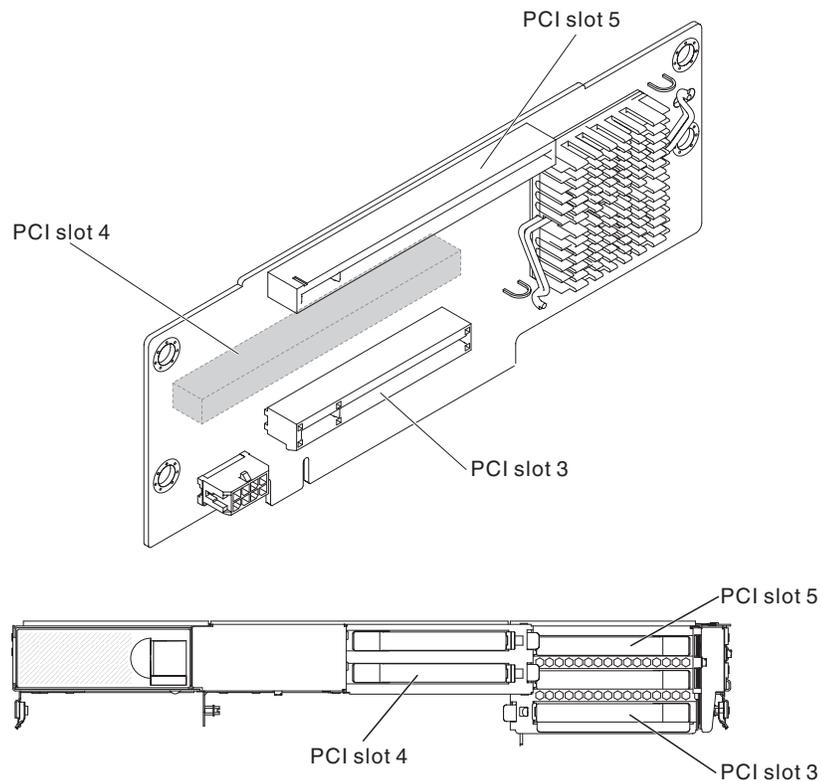
1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).
4. If an expansion enclosure is installed on the system-board tray, remove it (see “Removing an expansion enclosure” on page 32); otherwise, remove the system-board tray cover (see “Removing the system-board tray cover” on page 31).
5. Remove the riser-card retaining screw on the front of the chassis. Store the screw for future use.

**Note:** If an adapter is already installed in the riser card, the riser card and adapter are removed together.

6. Carefully grasp the front PCI riser-card assembly by its top edge or upper corners, and pull the riser card straight up and out of the system board.
7. Carefully set the riser card on a flat, static-protective surface. If an adapter is installed in the riser card, remove it.
8. Touch the static-protective package that contains the adapter that you are installing to any *unpainted* metal surface on the chassis or rack; then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
9. Follow the instructions that come with the adapter to set any jumpers or switches.
10. Carefully grasp the adapter by the top edge or upper corner and insert it in the front PCI riser-card assembly. Align the adapter with the connector on the riser card; then, press the adapter firmly into the connector.

**Notes:**

- a. Ensure that the tab on the riser-card bracket is properly aligned with the slot on the adapter bracket.
- b. If the PCI riser card has only 1 slot, then the PCIe adapter is aligned with slot 3. If the PCI riser card has 3 slots, then the PCIe adapters are aligned with slot 3, slot 4, and slot 5 respectively.



- c. Make sure that the adapter is inserted carefully. Improper installation of an adapter might damage the PCIe riser-card assembly or the adapter.
11. Follow the cabling instructions, if any, that come with the adapter. If possible, route the adapter cables before you install the adapter.

12. Pinch the two sides of the front PCI riser-card assembly, and align the riser card with the riser-card connector on the system board; then, press the riser card firmly, evenly with both hands, into the connector.
13. Install the riser-card retaining screw at the front of the chassis.

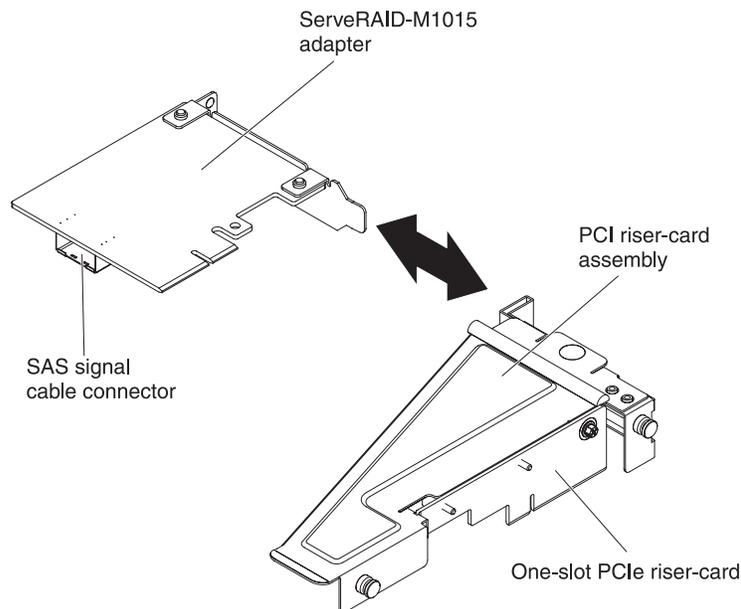
If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 53.

## Installing a ServeRAID-M1015 to a rear storage PCI riser-card assembly

This topic describes installing an adapter in a PCI expansion slot to a rear storage PCI riser-card assembly.

To ensure that a ServeRAID adapter works correctly in your server, make sure that the adapter firmware is at the latest level.

To install an adapter, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).
4. If an expansion enclosure is installed on the system-board tray, remove it (see “Removing an expansion enclosure” on page 32); otherwise, remove the system-board tray cover (see “Removing the system-board tray cover” on page 31).
5. Align the adapter with the PCI connector on the riser card and the guide on the external end of the riser-card assembly. Press the adapter firmly into the PCI connector on the riser card.
6. Connect any required cables to the adapter.

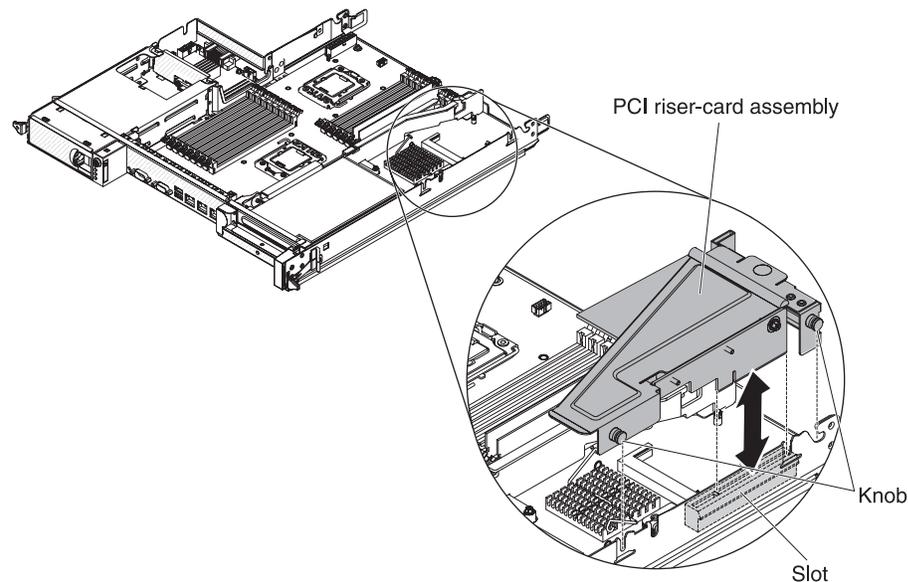
**Attention:**

- When you route cables, do not block any connectors or the ventilated space around any of the fans.
  - Make sure that cables are not routed on top of components under the PCI riser-card assembly.
  - Make sure that cables are not pinched by the server components.
7. Install the PCI riser-card assembly that contains the adapter (see “Installing a rear PCIe riser-card assembly in the system-board tray”).
  8. Perform any configuration tasks that are required for the adapter.
  9. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

## Installing a rear PCIe riser-card assembly in the system-board tray

**Note:** You can only install a ServeRAID-M1015 controller in the rear PCIe riser-card assembly.

To install a rear riser-card assembly, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).
4. If an expansion enclosure is installed on the system-board tray, remove it (see “Removing an expansion enclosure” on page 32); otherwise, remove the system-board tray cover (see “Removing the system-board tray cover” on page 31).
5. Reinstall any adapters and reconnect any internal cables you might have removed in other procedures.
6. Align the knobs of the PCI riser-card assembly with the PCI connector. Slide in and press down into the system board.

7. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

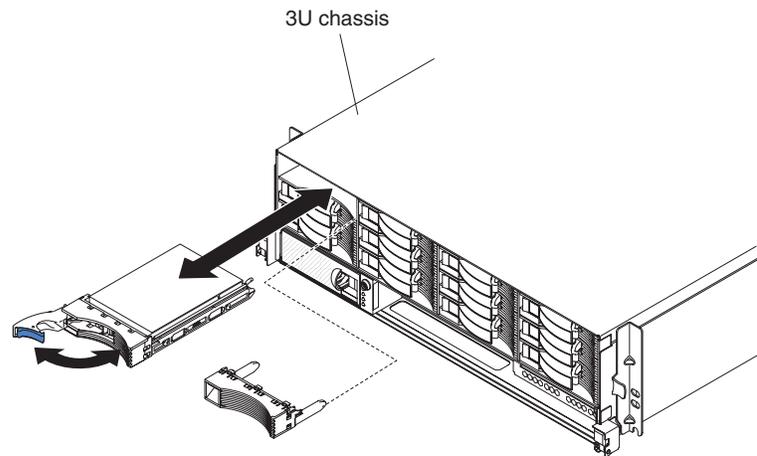
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## Installing a hard disk drive

The dx360 M3 server configurations support installation of four hard disk drive types. The following sections describe the installation of each type of hard disk drive.

### Installing a 3.5-inch hot-swap hard disk drive

**Note:** The following illustration shows how to install a 3.5-inch hot-swap hard disk drive in a 3U chassis.



To install a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the chassis or rack; then, remove the hard disk drive from the package.  
**Attention:** Do not press on the top of the drive. Pressing the top might damage the drive.
3. Make sure that the drive tray handle is in the open position.
4. Align the drive with the guide rails in the drive bay; then, carefully slide the drive into the bay until the drive stops.
5. Rotate the drive tray handle to the closed position.

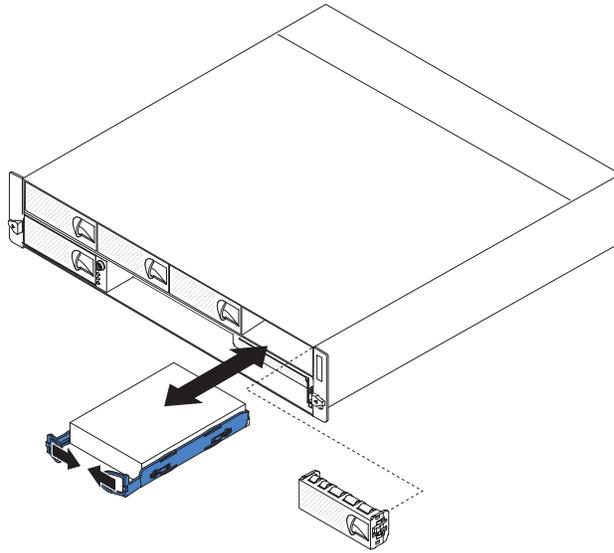
**Note:** If you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

### Installing a 3.5-inch simple-swap hard disk drive

**Notes:**

1. Depending on your server configuration, you can install either 3.5-inch SAS simple-swap hard disk drives or 3.5-inch SATA simple-swap hard disk drives. You cannot use SAS simple-swap hard disk drives and SATA simple-swap hard disk drives in the same server.

2. The following illustration shows how to install a 3.5-inch simple-swap hard disk drive in a 2U chassis.



To install a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the server and all attached devices (see “Turning off the system-board tray” on page 23).
3. Remove the filler panel from the simple-swap hard disk drive bay.
4. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the chassis or rack; then, remove the hard disk drive from the package.

**Attention:** Do not press on the top of the drive. Pressing the top might damage the drive.

5. Align the drive with the guide rails in the drive bay.
6. Pull the loops of the drive toward each other; then, carefully slide the drive into the bay until it stops, and release the loops.

**Note:** Do not release the loops on the drive until it is completely seated.

7. Install the filler panel in the simple-swap hard disk drive bay.

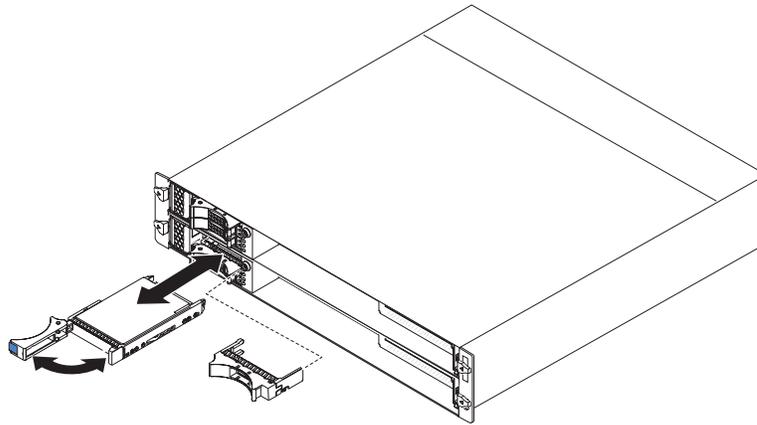
If you have other devices to install or remove, do so now. Otherwise, turn on the system-board tray (see “Turning on the system-board tray” on page 23).

**Note:** If the server has a PCIe RAID adapter and you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

## Installing a 2.5-inch hot-swap hard disk drive

### Notes:

1. The 2.5-inch hot-swap hard disk drives can be installed only in system configurations that support this drive type.
2. The following illustration shows how to install a 2.5-inch hot-swap hard disk drive in a 2U chassis.



To install a 2.5-inch hot swap hard disk drive, complete the following steps:

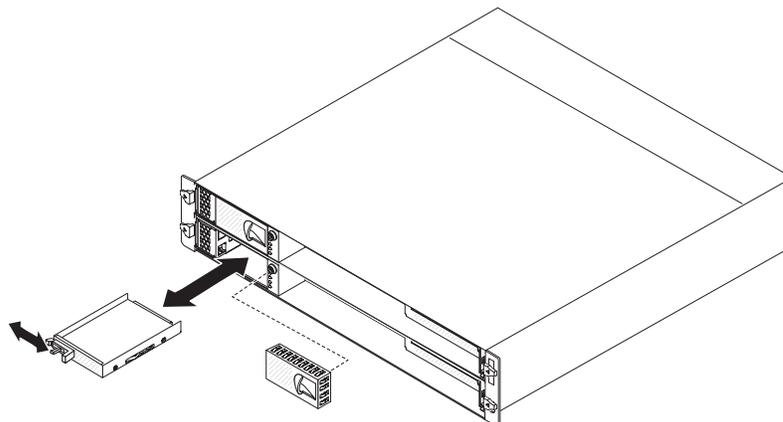
1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the chassis or rack; then, remove the hard disk drive from the package.  
**Attention:** Do not press on the top of the drive. Pressing the top might damage the drive.
3. Make sure that the drive tray handle is in the open position.
4. Align the drive with the guide rails in the drive bay; then, carefully slide the drive into the bay until the drive stops.
5. Rotate the drive tray handle to the closed position.

**Note:** If you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

## Installing a 2.5-inch simple-swap hard disk drive or solid-state drive

### Notes:

1. The 2.5-inch simple-swap hard disk drives or solid-state drives can be installed only in system configurations that support this drive type.
2. The following illustration shows how to install a 2.5-inch simple-swap hard disk drive or solid-state drive in a 2U chassis.



To install a 2.5-inch simple-swap hard disk drive or solid-state drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the server and all attached devices (see “Turning off the system-board tray” on page 23).
3. Remove the filler panel from the simple-swap hard disk drive bay.
4. Touch the static-protective package that contains the hard disk drive or solid-state drive to any *unpainted* metal surface on the chassis or rack; then, remove the drive from the package.

**Attention:** Do not press on the top of the drive. Pressing the top might damage the drive.

5. Align the drive with the guide rails in the drive bay.
6. Slide the retention tab; then, carefully slide the drive into the bay until it stops, and release the retention tab.
7. Install the filler panel in the simple-swap hard disk drive bay.

If you have other devices to install or remove, do so now. Otherwise, turn on the system-board tray (see “Turning on the system-board tray” on page 23).

**Note:** If the server has a PCIe RAID adapter and you install or remove a hard disk drive, see the documentation that comes with your RAID adapter for information about reconfiguring the disk arrays.

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## Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the system-board tray supports and other information that you must consider when you install DIMMs:

- The system-board tray supports only industry-standard double-data-rate 3 (DDR3), -800, -1066, or -1333 MHz, PC3-10600R-999, registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC).
- The system-board tray supports up to 16 DIMMs.
- The system-board tray supports three single-rank or dual-rank DIMMs per channel. Table 1 shows an example of the maximum amount of memory that you can install.

*Table 1. Maximum memory installation*

| DIMM type             | Maximum number of DIMMs | DIMM size | Total memory |
|-----------------------|-------------------------|-----------|--------------|
| Single-rank/dual-rank | 16                      | 2 GB      | 32 GB        |
| Dual-rank             | 16                      | 4 GB      | 64 GB        |
| Dual-rank             | 16                      | 8 GB      | 128 GB       |
| Quad-rank             | 12                      | 16 GB     | 192 GB       |

- Table 2 on page 49 lists the DIMM connectors on each memory channel.

Table 2. Connectors on each memory channel

| Memory channel | Microprocessor 1 DIMM connectors | Microprocessor 2 DIMM connectors |
|----------------|----------------------------------|----------------------------------|
| Channel 0      | 1, 2, and 3                      | 9, 10, and 11                    |
| Channel 1      | 4, 5, and 6                      | 12, 13, and 14                   |
| Channel 2      | 7 and 8                          | 15 and 16                        |

- The DIMM options that are available are 2 GB, 4 GB, and 8 GB. The system-board tray supports a minimum of 2 GB and a maximum of 128 GB of system memory.

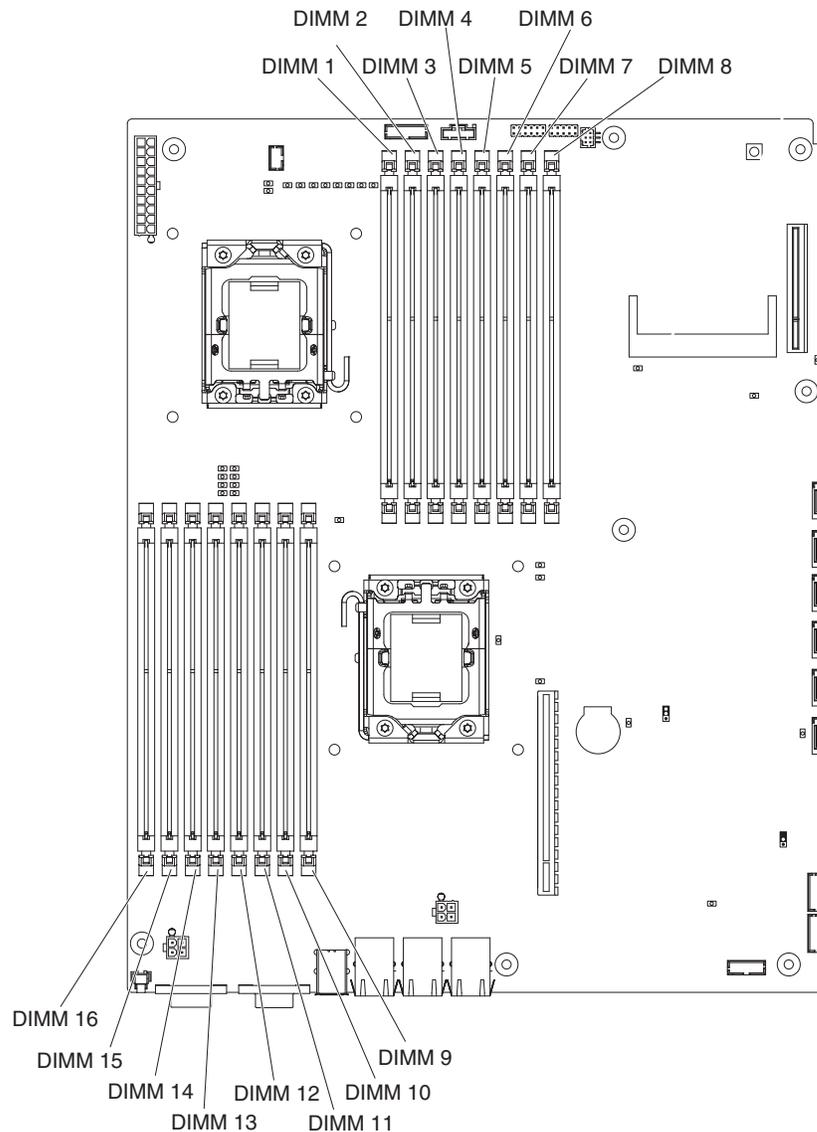
**Note:** The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see “Using the Setup utility” on page 62.

- A minimum of two DIMMs must be installed for each microprocessor. However, to improve system performance, install a minimum of three DIMMs for each installed microprocessor.
- The maximum operating speed of the system-board tray is determined by the slowest DIMM, the number of DIMMs on each channel, and the combination of DIMM rank and speed.
- The system-board tray comes with a minimum of two 2 GB DIMMs, installed in slots 3 and 6. When you install additional DIMMs, install the DIMMs in the order shown in Table 3 to optimize system performance. All three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 3. Non-mirroring (normal) mode DIMM installation sequence

| Microprocessors installed | DIMM connector   |
|---------------------------|--|
| 1                         | 3, 6, 8, 2, 5, 7, 1, then 4                                |
| 2                         | 3, 11, 6, 14, 8, 16, 2, 10, 5, 13, 7, 15, 1, 9, 4, then 12 |

- The following illustration shows the DIMM connectors on the system board.



- Memory-mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of DIMMs to the backup pair of DIMMs. You must enable memory mirroring through the Setup utility. See “Using the Setup utility” on page 62. When you use the memory-mirroring mode, you must consider the following information:
  - Table 4 and Table 5 on page 51 show the installation sequence for installing DIMMs in memory-mirroring mode.

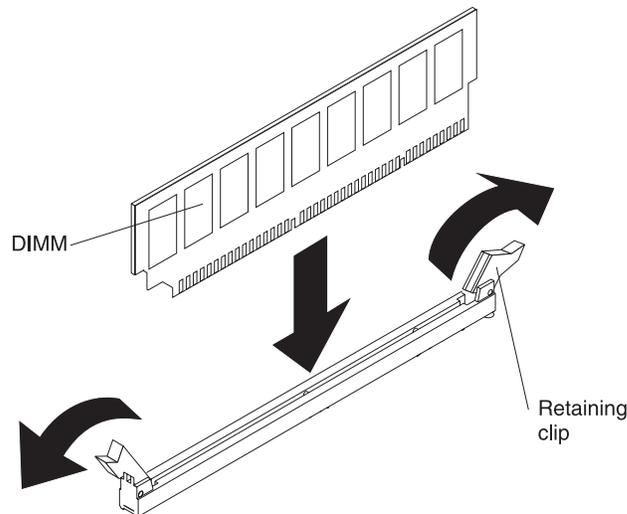
Table 4. Microprocessor 1 memory-mirroring DIMM installation sequence

| Microprocessor number | Pair | DIMM connectors |
|-----------------------|------|-----------------|
| 1                     | 1    | 3, 6            |
| 1                     | 2    | 2, 5            |
| 1                     | 3    | 1, 4            |

Table 5. Microprocessor 2 memory-mirroring DIMM installation sequence

| Microprocessor number | Pair | DIMM connectors |
|-----------------------|------|-----------------|
| 2                     | 1    | 11, 14          |
| 2                     | 2    | 10, 13          |
| 2                     | 3    | 9, 12           |

- To support memory mirroring, the DIMMs in each pair must match but the pairs can be different from each other. For example, the first pair of DIMMs must match and the second pair of DIMMs must match; however, the first and second pair of DIMMs can be different from each other.
  - Channel 2 DIMM connectors are not used in memory-mirroring mode.
  - The maximum available memory is reduced by half when memory mirroring is enabled. For example, if you install 64 GB of memory, only 32 GB of addressable memory is available when you use memory mirroring.
  - The server supports online-spare memory. This feature disables the failed memory from the system configuration and activates an online-spare DIMM to replace the failed active DIMM. You can enable either online-spare memory or memory mirroring in the Setup utility (see “Using the Setup utility” on page 62).
- Note:** The memory online-spare feature is supported on server models with an Intel Xeon™ 5600 series microprocessor.
- When you install or remove DIMMs, the system-board tray configuration information changes. When you restart the system-board tray, the system displays a message that indicates that the memory configuration has changed.



To install a DIMM, complete the following steps:

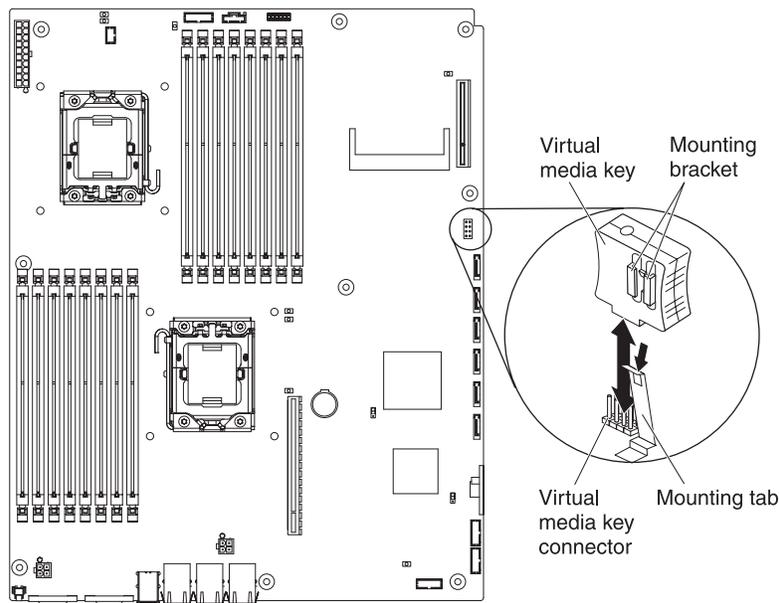
1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Read the documentation that comes with the DIMM.
3. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).
4. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).

5. If an expansion enclosure is installed on the system-board tray, remove it (see “Removing an expansion enclosure” on page 32); otherwise, remove the system-board tray cover (see “Removing the system-board tray cover” on page 31).
6. Locate the DIMM connectors (see “System-board connectors” on page 15). Determine the connectors into which you will install the DIMMs.  
**Attention:** To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
7. Open the retaining clips and, if necessary, remove any existing DIMM.
8. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the system-board tray; then, remove the DIMM from the package.
9. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.
10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.  
**Attention:** If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 53.

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## Installing an IBM virtual media key



To install an IBM virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 26.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 23).

3. If the system-board tray is installed in a chassis, remove it (see “Removing a system-board tray from a 2U chassis” on page 29 or “Removing a system-board tray from a 3U chassis” on page 30).
4. If an expansion enclosure is installed on the system-board tray, remove it (see “Removing an expansion enclosure” on page 32); otherwise, remove the system-board tray cover (see “Removing the system-board tray cover” on page 31).
5. Align the virtual media key with the connector.
6. Press on the virtual media key until it is firmly seated in the connector and make sure that the retention clip engages the virtual media key.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation”.

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## Completing the installation

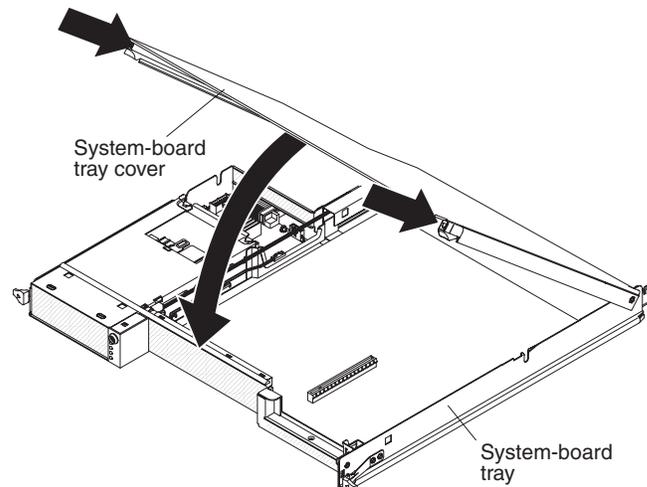
To complete the installation, complete the following tasks. Instructions for each task are in one of the following sections.

1. Install the system-board tray cover (see “Reinstalling the system-board tray cover”) or expansion enclosure (see “Reinstalling an expansion enclosure” on page 54).
2. Install the system-board tray in the chassis (see “Reinstalling a system-board tray in a 2U chassis” on page 55 or “Reinstalling a system-board tray in a 3U chassis” on page 56).
3. Connect the cables. For more information, see “Connecting the cables” on page 59.
4. For some devices, run the server Setup utility. For more information, see “Updating the server configuration” on page 59.

## Reinstalling the system-board tray cover

**Attention:** You cannot install the system-board tray into the chassis until the cover is installed and closed or an expansion enclosure is installed. Do not attempt to override this protection.

**Note:** If an expansion enclosure is installed on the system-board tray, the system-board tray cover is not used.

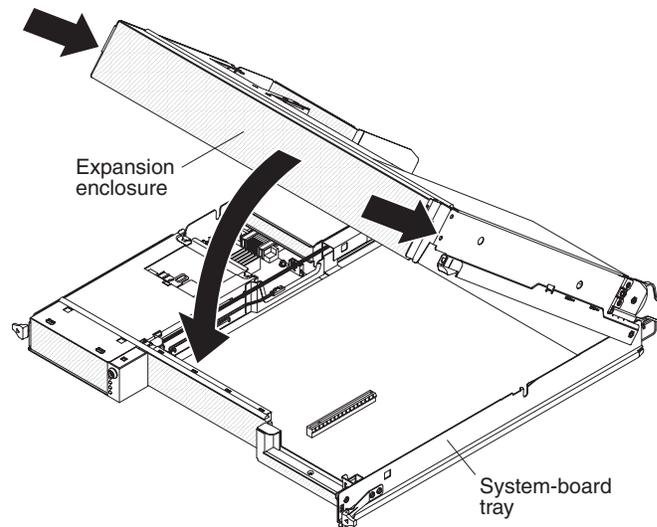


To reinstall the system-board tray cover, complete the following steps:

1. Lower the cover so that the pins at the rear slide down into the slots at the rear of the system-board tray. Before you close the cover, make sure that all components are installed and seated correctly, all internal cables are correctly routed, and you have not left loose tools or parts inside the system-board tray.
2. Pivot the cover to the closed position until it clicks into place.
3. Install the system-board tray in the chassis (see “Reinstalling a system-board tray in a 2U chassis” on page 55 or “Reinstalling a system-board tray in a 3U chassis” on page 56).

## Reinstalling an expansion enclosure

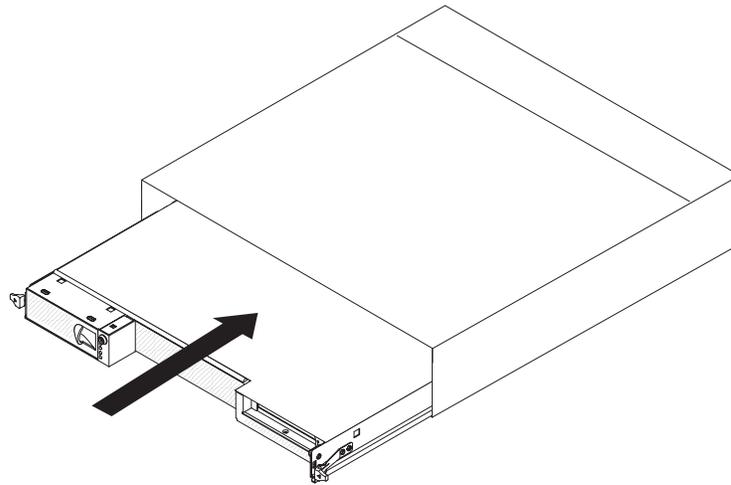
**Attention:** You cannot install the system-board tray into the chassis until the cover is installed and closed or an expansion enclosure is installed. Do not attempt to override this protection.



To reinstall an expansion enclosure, complete the following steps:

1. Orient the expansion enclosure above the system-board tray.
2. Lower the expansion enclosure so that the pins at the rear slide down into the slots at the rear of the system-board tray. Before you close the cover, make sure that all components are installed and seated correctly, all internal cables are correctly routed, and you have not left loose tools or parts inside the system-board tray.
3. If you disconnected cables when you removed the enclosure, reconnect them.
4. Pivot the expansion enclosure down onto the system-board tray until it clicks into place.
5. Install the system-board tray in the chassis (see “Reinstalling a system-board tray in a 2U chassis” on page 55).

## Reinstalling a system-board tray in a 2U chassis

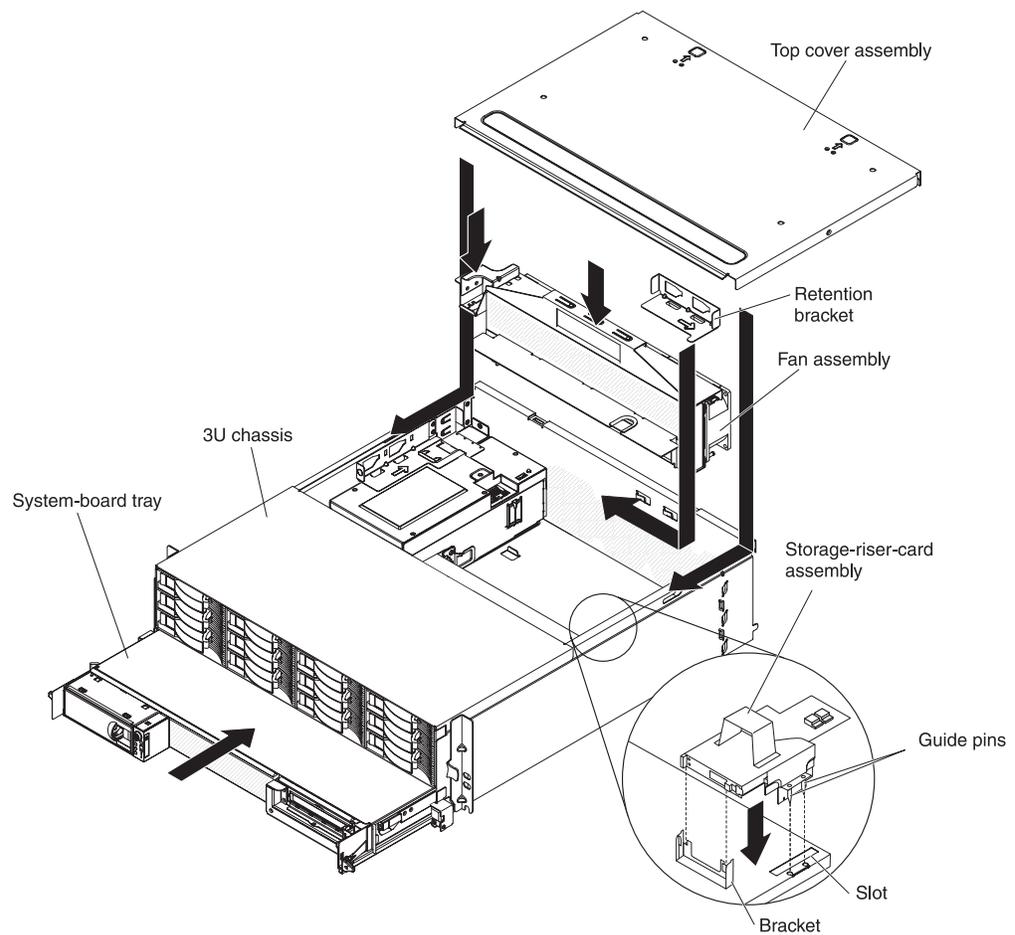


To reinstall a system-board tray in a 2U chassis, complete the following steps:

1. If an expansion enclosure is installed on the system-board tray, make sure that the blue air damper actuator is parallel to the system-board tray before you slide the assembly into the chassis.
2. Slide the system-board tray into the chassis until it stops and the release handles click into place.
3. Reconnect the cables on the front of the system-board tray.
4. Turn on the system-board tray (see “Turning on the system-board tray” on page 23).
5. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you have changed the configuration of the system-board tray, you might have to update the server configuration through the Setup utility (see “Updating the server configuration” on page 59).

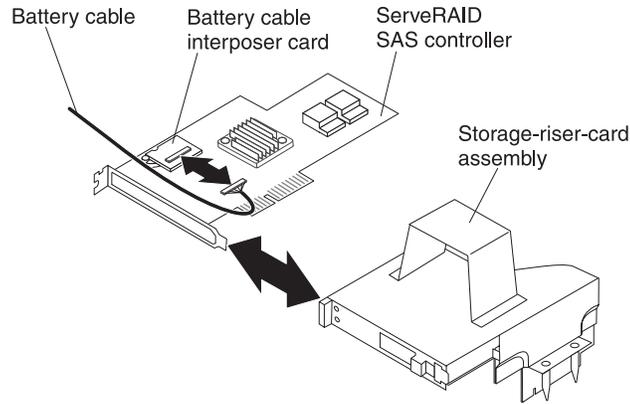
## Reinstalling a system-board tray in a 3U chassis



**Note:** You must remove the 3U chassis from the iDataPlex rack before you install the system-board tray (see “Removing a 3U chassis from an iDataPlex rack” on page 28).

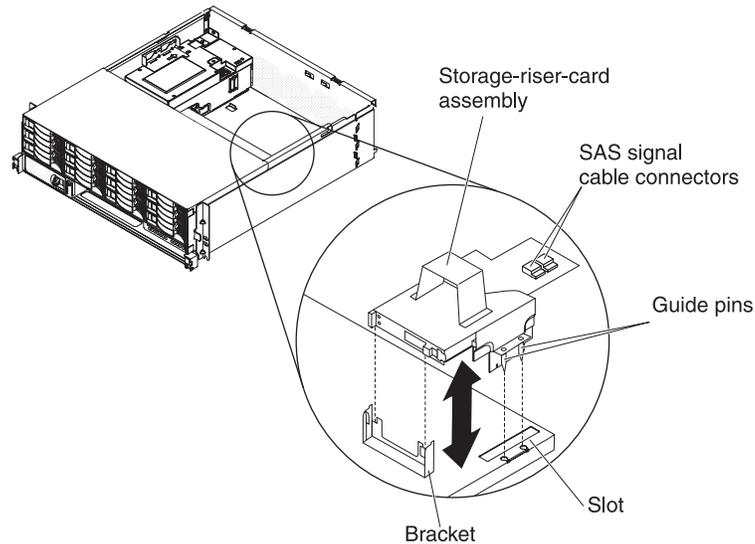
To reinstall a system-board tray in a 3U chassis, complete the following steps:

1. Slide the system-board tray into the 3U chassis until it stops.
2. Reconnect the cables that connect the system-board tray and optional adapter to the 3U chassis.
3. Turn the fan assembly so that the connector aligns correctly with the connector in the power supply.
4. Insert the fan assembly into the 3U chassis. Firmly press the fan assembly straight down into the chassis by applying pressure on both fan-assembly handles simultaneously.
5. Reinstall the retention bracket that secures the fan assembly.



6. Connect the battery cable to the battery cable interposer card.
7. Align the ServeRAID SAS controller with the connector and the bracket on the storage-riser-card assembly and press the controller into place.

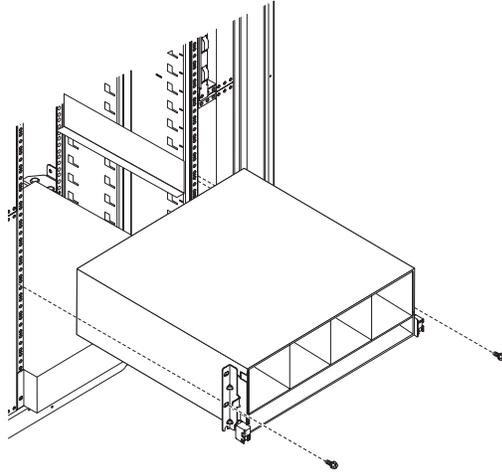
**Attention:** When you move the storage-riser-card assembly, do not allow it to touch any components or structures inside the 3U chassis.



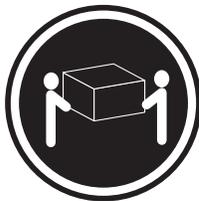
8. Align the storage-riser-card assembly with the guide pins and the slot in the system-board tray cover.
9. Press the assembly into place on the bracket.
10. Reconnect the signal cables to the ServeRAID SAS controller.
11. Align the top-cover assembly with the rear of the 3U chassis; then, slide it forward until it clicks into place.
12. Reinstall the 3U chassis in the iDataPlex rack (see “Reinstalling a 3U chassis in an iDataPlex rack” on page 58).
13. Install the hard disk drives (see “Installing a hard disk drive” on page 45).
14. Reconnect the cables on the front of the system-board tray.
15. Turn on the system-board tray (see “Turning on the system-board tray” on page 23).
16. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you have changed the configuration of the system-board tray, you might have to update the server configuration through the Setup utility (see “Updating the server configuration” on page 59).

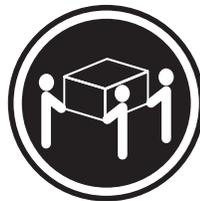
## Reinstalling a 3U chassis in an iDataPlex rack



### Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

### **CAUTION:** Use safe practices when lifting.

To reinstall a 3U chassis in an iDataPlex rack, complete the following steps:

1. Align the 3U chassis with the rails on the iDataPlex rack; then, slide the 3U chassis into the rack until it is fully seated.
2. Install the M6 screws that secure the chassis to the rack.
3. Install the hard disk drives (see “Installing a hard disk drive” on page 45).
4. Reconnect the cables on the front of the system-board tray.
5. Turn on the system-board tray (see “Turning on the system-board tray” on page 23).
6. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you have changed the configuration of the system-board tray, you might have to update the server configuration through the Setup utility (see “Updating the server configuration”).

## Connecting the cables

**Attention:** To prevent damage to equipment, connect cables before you turn on the system-board tray.

All cable connections, other than power, are on the front of the server. See “Operator panel controls, connectors, LEDs, and power” on page 21 for connector locations.

## Updating the server configuration

When you start the server for the first time after you add or remove a device, you might receive a message that the configuration has changed. The Setup utility starts automatically so that you can save the new configuration settings. For more information, see Chapter 4, “Configuring the dx360 M3 server,” on page 61.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays. For more information about the RAID controller, go to <http://www-304.ibm.com/jct01004c/systems/support/supportsite.wss/docdisplay?Indocid=MIGR-65723&brandind=5000008> or complete the following steps.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **Hardware upgrades**.
3. Under **Product family**, click **RAID**.
4. Under **Type**, click the type of RAID controller that is installed in your server.

For information about configuring the integrated Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 71.



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## Chapter 4. Configuring the dx360 M3 server

To update the firmware, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. To run the Setup utility or the Dynamic System Analysis (DSA) Preboot diagnostic program, you must have the following additional hardware:

- Monitor
- Combination USB keyboard and pointing device such as IBM part number 40K5372

Optionally, to run the DSA Preboot diagnostic program, you can use a USB flash drive (memory key). A USB flash drive is provided in the accessory carton that comes with the configured rack solution.

The following configuration programs come with the dx360 M3 server:

- **Setup utility**

Use the Setup utility to configure low-level system settings, such as the startup-device sequence, date and time, and passwords. For information about using this program, see “Using the Setup utility” on page 62.
- **Boot Menu program**

The Boot Menu program is part of the UEFI firmware. Use it to override the startup sequence that is set in the Setup utility and temporarily assign a device to be first in the startup sequence. For information about using this program, see “Using the Boot Menu program” on page 67.
- **Integrated management module**

Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using the IMM, see “Using the integrated management module” on page 68.
- **Remote presence capability and blue-screen capture**

The remote presence and blue-screen capture feature are integrated into the integrated management module (IMM). The virtual media key is required to enable these features. When the optional virtual media key is installed in the server, it activates the remote presence functions. Without the virtual media key, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you will still be able to access the host graphical user interface through the web interface without the virtual media key. You can order the optional IBM Virtual Media Key, if one did not come with your server. For more information about how to enable the remote presence function, see “Using the remote presence capability and blue-screen capture” on page 69.
- **IBM Advanced Settings Utility (ASU)**

Use ASU to modify firmware settings from the command line without the need to restart the system to access the Setup utility. You can also use ASU to issue selected IMM setup commands. The ASU supports scripting environments through its batch-processing mode. For information about using this program, see “IBM Advanced Settings Utility program” on page 71.
- **Ethernet controller configuration**

For information about configuring the Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 71.
- **LSI Logic Configuration Utility program**

Some server configurations use the LSI Logic Configuration Utility program to configure an optional LSI RAID controller and the devices that are attached to it. For information about using this program, see “Using the LSI Logic Configuration Utility program” on page 72.

- **ServeRAID configuration program**

Some server configurations use the ServeRAID configuration program to configure an optional ServeRAID controller and the devices that are attached to it. For information about using this program, see “Configuring a ServeRAID controller” on page 74.

- **IBM Electronic Service Agent™**

IBM Electronic Service Agent is a software tool that monitors the server for hardware error events and automatically submits electronic service requests to IBM service and support. Also, it can collect and transmit system configuration information on a scheduled basis so that the information is available to you and your support representative. It uses minimal system resources, is available free of charge, and can be downloaded from the Web. For more information and to download Electronic Service Agent, go to <http://www.ibm.com/support/electronic/>.

- **IBM Dynamic System Analysis (DSA) Preboot Diagnostic Programs**

The IBM Dynamic System Analysis (DSA) Preboot diagnostic programs are the primary method of testing the major components of an IBM System x iDataPlex server. You can use the USB flash drive that comes with the iDataPlex rack when you run the DSA Preboot diagnostic programs on an iDataPlex server.

To download the most current USB or ISO image of the DSA Preboot diagnostic programs go to <http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA>.

For additional information about the DSA diagnostic programs, see the *Problem Determination and Service Guide* for the iDataPlex server on the IBM *Documentation CD* that comes with the iDataPlex rack solution.

- **IBM Storage Configuration Manager (SCM)**

Use SCM to manage the storage configuration of your virtual environment from a single console. SCM is part of the Virtualization Manager plug-in to IBM Systems Director. For more information and to download the Storage Configuration Manager, go to <http://www.ibm.com/systems/support/>.

- **IBM Systems Director**

IBM Systems Director is a platform-management foundation that streamlines the way you manage physical and virtual systems in a heterogeneous environment. For information about updating IBM Systems Director, see “Updating IBM Systems Director” on page 75.

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## Using the Setup utility

Use the Setup utility to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

## Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.
2. When the prompt <F1> Setup is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.
3. Select settings to view or change.

## Setup utility menu choices

The following choices are on the Setup utility main menu. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

- **System Summary**

Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

- **Product Data**

Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

- **System Settings**

Select this choice to view or change the server component settings.

- **Processors**

Select this choice to view or change the processor settings.

- **Memory**

Select this choice to view or change the memory settings. To configure memory mirroring, select **System Settings** → **Memory** , and then select **Memory Channel Mode** → **Mirroring**.

- **Devices and I/O Ports**

Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA controller, SATA optical drive channels, and PCI slots; and view the system Ethernet MAC addresses. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

- **Power**

Select this choice to view or change power capping to control consumption, processors, and performance states.

- **Operating Modes**

Optimize system for minimum power usage/acoustic level, power efficiency, or performance.

- **Legacy Support**
  - Select this choice to view or set legacy support.
  - **Force Legacy Video on Boot**
    - Select this choice to force INT video support, if the operating system does not support UEFI Video Output Standards.
  - **Rehook INT**
    - Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.
  - **Legacy Thunk Support**
    - Select this choice to enable or disable legacy thunk support.
- **Integrated Management Module**
  - Select this choice to view or change the settings for the integrated management module.
  - **POST Watchdog Timer**
    - Select this choice to view or enable the POST watchdog timer.
  - **POST Watchdog Timer Value**
    - Select this choice to view or set the POST loader watchdog timer value.
  - **Reboot System on NMI**
    - Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.
  - **Network Configuration**
    - Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and host name; define the static IMM IP address, subnet mask, and gateway address; specify whether to use the static IP address or have DHCP assign the IMM IP address; save the network changes; and reset the IMM.
  - **Reset IMM to Defaults**
    - Select this choice to view or reset IMM to the default settings.
- **System Security**
  - Select this choice to view or set the Trusted Platform Module (TPM) options.
  - **TPM Physical Presence**
    - Select this choice to display the current state of the TPM physical presence. This must be asserted for TPM commands to succeed.
  - **Refresh TPM Physical Presence State**
    - Select this choice to refresh the current state of the TPM physical presence.
  - **TPM Enabled Status**
    - Select this choice to enable/disable and activate/deactivate state of the TPM.
  - **TPM Device**
    - Select this choice to enable/disable the TPM device. This command requires the TPM physical presence to be asserted.
  - **TPM State**
    - Select this choice to activate/deactivate the TPM device. This command requires the TPM physical presence to be asserted.
  - **TPM Force Clear**
    -

Select this choice to force clearing TPM data. **!!! Warning !!!** This will erase the contents of the TPM. This command requires the TPM physical presence to be asserted.

– **Adapters and UEFI Drivers**

Select this choice to view information about the adapters and UEFI drivers in the server.

– **Network**

Select this choice to see all of the device options, such as the iSCSI, PXE, and Ethernet parameters.

• **Date and Time**

Select this choice to set the date and time in the server, in 24-hour format (*hour:minute:second*).

• **Start Options**

Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

This choice is on the full Setup utility menu only.

• **Boot Manager**

Select this choice to view, add, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

• **System Event Logs**

Select this choice to enter the System Event Manager, where you can view the error messages in the system event logs. You can use the arrow keys to move between pages in the error log.

The system event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur. See the *Problem Determination and Service Guide* on the IBM *Documentation* CD for instructions for running the diagnostic programs.

**Important:** If the system-error LED on the front of the server is lit but there are no other error indications, clear the system-event log. Also, after you complete a repair or correct an error, clear the system-event log to turn off the system-error LED on the front of the server.

– **POST Event Viewer**

Select this choice to view the error messages in the POST event viewer.

– **System Event Log**

Select this choice to view the error messages in the system-event log.

– **Clear System Event Log**

Select this choice to clear the system-event log.

• **User Security**

Select this choice to set, change, or clear passwords. See “Passwords” on page 66 for more information.

This choice is on the full and limited Setup utility menu.

– **Set Power-on Password**

Select this choice to set or change a power-on password. For more information, see “Power-on password” on page 67.

– **Clear Power-on Password**

Select this choice to clear a power-on password. For more information, see “Power-on password” on page 67.

– **Set Administrator Password**

Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 67.

– **Clear Administrator Password**

Select this choice to clear an administrator password. For more information, see “Administrator password” on page 67.

• **Save Settings**

Select this choice to save the changes that you have made in the settings.

• **Restore Settings**

Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

• **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

• **Exit Setup**

Select this choice to exit from the Setup utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

## Passwords

From the **User Security** choice, you can set, change, and delete a power-on password and an administrator password. The **User Security** choice is on the full Setup utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Setup utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Setup utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Setup utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Setup utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

## Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A – Z, a – z, and 0 – 9) for the password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup utility and reset the power-on password.
- Clear the password by clearing CMOS memory (see the *Problem Determination and Service Guide* for instructions).

## Administrator password

An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu.

If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of up to seven characters (A – Z, a – z, and 0 – 9) for the password.

**Attention:** If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

---

## Using the Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

To use the Boot Menu program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. Press F12 (**Select Boot Device**). If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up Arrow and Down Arrow keys to select an item from the **Boot Selection Menu** and press Enter.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

---

## Starting the backup UEFI firmware

The system board contains a backup copy area for the UEFI (formerly called BIOS) firmware. This is a secondary copy of UEFI firmware that you update only during the process of updating UEFI firmware. If the primary copy of the UEFI firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the JP2 jumper in the backup position (pins 2 and 3). See “System-board jumpers” on page 16 for the location of the JP2 jumper.

Use the backup copy of the UEFI firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the JP2 jumper back to the primary position (pins 1 and 2).

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## Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and (when an optional virtual media key is installed) remote presence function in a single chip.

The IMM supports the following basic systems-management features:

- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure.
- Diagnostic LEDs to report errors that occur with power supplies, microprocessor, hard disk drives, and system errors.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system error LED and the failing DIMM error LED.
- System-event log.
- ROM-based IMM firmware flash updates.
- Auto Boot Failure Recovery.
- A virtual media key, which enables full systems-management support (remote video, remote keyboard/mouse, and remote storage).
- When one of the two microprocessors reports an internal error, the server disables the defective microprocessor and restarts with the one good microprocessor.
- NMI detection and reporting.
- SMI handling.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the OS watchdog timer times out. The IMM might be configured to watch for the OS watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM allows the administrator to generate an NMI by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Serial redirect.
- Serial over LAN (SOL).
- Active Energy Manager.
- Query power-supply input power.
- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Operating-system failure blue screen capture.
- Command-line interface.
- Configuration save and restore.
- PCI configuration data.
- Boot sequence manipulation.

The IMM also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

---

## Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). When the optional IBM Virtual Media Key is installed in the server, it activates full systems-management functions. The virtual media key is required to enable the integrated remote presence and blue-screen capture features. Without the virtual media key, you cannot remotely mount or unmount drives or images on the client system. However, you still can access the Web interface without the key.

After the virtual media key is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, you receive a message from the Web interface (when you attempt to start the remote presence feature) indicating that the hardware key is required to use the remote presence feature.

The virtual media key has an LED. When this LED is lit and green, it indicates that the key is installed and functioning correctly.

The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

## Enabling the remote presence feature

To enable the remote presence feature, complete the following steps:

1. Install the virtual media key into the dedicated slot on the system board (see “Installing an IBM virtual media key” on page 52).
2. Turn on the server.

**Note:** Approximately 1 to 2 minutes after the server is connected to ac power, the power-control button becomes active.

## Obtaining the IP address for the Web interface access

To access the Web interface and use the remote presence feature, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup utility. To locate the IP address, complete the following steps:

1. Turn on the server.

**Note:** Approximately 1 to 2 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt <F1> Setup is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. On the next screen, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup utility.

## Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, complete the following steps:

1. Open a Web browser on a computer that connects to the server and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

**Notes:**

- a. If you are logging in to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP host is not available, the IMM uses the default static IP address 192.168.70.125.
- b. You can obtain the DHCP-assigned IP address or the static IP address from the server UEFI or from your network administrator.

The Login page is displayed.

2. Type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log. A welcome page opens in your browser.

**Note:** The IMM is set initially with a user name of USERID and password of PASSWORD (passw0rd with a zero, not a the letter O). You have read/write access. For enhanced security, change this default password during your initial configuration.

3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off of the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The browser opens the System Status page, which gives you a quick view of the server status and the server health summary.

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## IBM Advanced Settings Utility program

The Advanced Settings Utility (ASU) program is an alternative to the Setup utility for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the system to access the Setup utility.

You can also use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

For more information and to download the ASU program, go to <http://www.ibm.com/systems/support/>.

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## Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controller, complete the following steps.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

### Notes:

- Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.
  - To install the device driver for the Ethernet controller, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. See “Firmware updates” on page 74 for additional instructions about using an external USB CD-RW/DVD drive.
1. Go to <http://www.ibm.com/systems/support/>.
  2. Under **Product support**, click **System x**.
  3. Under **Popular links**, click **Software and device drivers**.
  4. From the **Product family** menu, select **System x iDataPlex dx360 M3 server** and click **Go**.

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## Using the LSI Logic Configuration Utility program

Use the information in this section to configure an optional LSI RAID controller. If you need to configure an optional ServeRAID controller, see “Configuring a ServeRAID controller” on page 74.

Use the LSI Logic Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use the program as described in this document. Use the LSI Logic Configuration Utility program to perform the following tasks:

- Perform a low-level format of a SCSI hard disk drive
- View or change SCSI IDs for attached devices
- Set a SCSI device scan order
- Set SCSI protocol parameters on SCSI hard disk drives
- Configure arrays
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers
- Create a mirrored pair of SCSI hard disk drives with or without a hot-spare drive

The integrated SCSI controller with RAID capabilities supports redundant array of independent disks (RAID) arrays. You can use the LSI Logic Configuration Utility program to configure RAID level-1 for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change SCSI settings for attached devices.

You can download an LSI command-line configuration program (CFG1030) from <http://www.ibm.com/systems/support/>. For more information about the RAID controller, go to <http://www-304.ibm.com/jct01004c/systems/support/supportsite.wss/docdisplay?Indocid=MIGR-65723&brandind=5000008> or complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **Hardware upgrades**.
3. Under **Product family**, click **RAID**.
4. Under **Type**, click on the type of RAID controller that is installed in your server.

When you use the LSI Logic Configuration Utility program to configure and manage arrays, review the following information:

- The integrated SCSI controller with RAID capabilities in the server supports only RAID level-1 with a hot-spare drive installed. Installing an optional ServeRAID controller provides additional RAID levels.
- When you create a RAID level-1 (mirrored) pair, all drives must be on the same channel.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- You can set up a mirror after the operating system is installed on the primary drive only if you are using an integrated SCSI controller with RAID capabilities. You must make sure that the primary drive has the lower SCSI ID (for example, 0).

**Important:** If you use an integrated SCSI controller with RAID capabilities to configure a RAID level-1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.

- If you install a different type of RAID controller, follow the instructions in the documentation that comes with the controller to view or change SCSI settings for attached devices.

The following sections provide instructions for starting the LSI Logic Configuration Utility program and performing selected functions.

## Starting the LSI Logic Configuration Utility program

To start the LSI Logic Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt <<< Press <CTRL><C> to start LSI Logic Configuration Utility >>> is displayed, press Ctrl+C. If you have set an administrator password, you are prompted to type the password.
3. To select a controller (channel) from the list of adapters, use the arrow keys and press Enter.
4. To change the settings of the selected items, follow the instructions on the screen. If you select **Device Properties** or **Mirroring Properties**, additional screens are displayed.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

## Formatting a SCSI hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

**Note:** Before you format a SCSI hard disk, make sure that the disk is not part of a mirrored pair. From the list of adapters, select the controller (channel) for the drive that you want to format. Select **Mirroring Properties** and make sure that the mirroring value for the drive is **None**.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format.
2. Select **Device Properties**.
3. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key.
4. To start the low-level formatting operation, select **Format** and press Enter.

## Creating a mirrored pair of SCSI hard disk drives

To create a mirrored pair of SCSI hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.
2. Select **Mirroring Properties**.
3. Use the arrow keys to highlight the first drive in the pair; then, press the Minus key to change the mirroring value to **Primary**.

4. Use the arrow keys to highlight the second drive in the pair; then, press the Minus key to change the mirroring value to **Secondary**.
5. To establish a third drive that will take over the function of either mirrored drive in the event of a failure, use the arrow keys to highlight the drive that you want to use for that purpose; then, press the Minus key to change the mirroring value to **Hot Spare**.

---

## Configuring a ServeRAID controller

Use the information in this section to configure an optional ServeRAID controller. If you need to configure an optional LSI RAID controller, see “Using the LSI Logic Configuration Utility program” on page 72.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To update the firmware and UEFI code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the controller.

**Note:** To update the firmware and UEFI code for an optional ServeRAID controller, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. See “Firmware updates” for additional instructions about using an external USB CD-RW/DVD drive.

For more information about the ServeRAID controller, go to <http://www-304.ibm.com/jct01004c/systems/support/supportsite.www/docdisplay?Indocid=MIGR-4JTS2T&brandind=5000008> or complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **Hardware upgrades**.
3. Under **Product family**, click **RAID**.
4. Under **Type**, click on the type of RAID controller that is installed in your server.

---

## Firmware updates

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

The firmware for the server is periodically updated and is available for download from the Web. To check for the latest level of firmware, such as BIOS code, vital product data (VPD) code, device drivers, and service processor firmware complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.

4. Click **System x iDataPlex dx360 M3 server** to display the matrix of downloadable files.

Download the latest firmware for the server; then, install the firmware, using the instructions that are included with the downloaded files.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

- UEFI code is stored in ROM on the system board.
- IMM firmware is stored in ROM on the integrated management controller on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the ServeRAID SAS controller.
- SAS firmware is stored in ROM on the ServeRAID SAS controller.
- Major components contain vital product data (VPD) code. You can select to update the VPD code during the UEFI code update procedure.

The following items are downloadable at <http://www.ibm.com/systems/support/>:

- Diagnostics programs
- IMM firmware
- Ethernet firmware

**Important:** To avoid problems and to maintain proper system performance, always make sure that the UEFI code, service processor, and other firmware levels are consistent for all iDataPlex servers.

To update the firmware, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. To use an external USB CD-RW/DVD drive to update the firmware, complete the following steps:

1. If the system-board tray is running, turn off the system-board tray and all attached devices.
2. Connect a USB CD or DVD drive to a USB connector on the front of the system-board tray.
3. Turn on all attached devices; then, turn on the system-board tray.
4. When the prompt <F1> Setup is displayed, press F1.
5. From the Setup utility menu, select **Startup Options**.
6. Note the device that is selected as the first startup device. Later, you must restore this setting.
7. Select **CD/DVD-ROM** as the first startup device.
8. Press Esc to return to the Setup utility menu.
9. Insert the CD or DVD containing the firmware update into the CD or DVD drive.
10. Select **Save Changes and Exit** and follow the prompts.

---

## Updating IBM Systems Director

If you plan to use IBM Systems Director to manage the server, you must check for the latest applicable IBM Systems Director updates and interim fixes.

To locate and install a newer version of IBM Systems Director, complete the following steps:

**Notes:**

- Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.
  - To update IBM Systems Director software, you might have to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. See “Firmware updates” on page 74 for additional instructions about using an external USB CD-RW/DVD drive.
1. Check for the latest version of IBM Systems Director:
    - a. Go to <http://www.ibm.com/systems/management/director/downloads.html>.
    - b. If a newer version of IBM Systems Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.
  2. Install the IBM Systems Director program.

If your management server is connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On the Welcome page of the IBM Systems Director Web interface, click **View updates**.
3. Click **Check for updates**. The available updates are displayed in a table.
4. Select the updates that you want to install, and click **Install** to start the installation wizard.

If your management server is not connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On a system that is connected to the Internet, go to <http://www.ibm.com/eserver/support/fixes/fixcentral/>.
3. From the **Product family** list, select **IBM Systems Director**.
4. From the **Product** list, select **IBM Systems Director**.
5. From the **Installed version** list, select the latest version, and click **Continue**.
6. Download the available updates.
7. Copy the downloaded files to the management server.
8. On the management server, on the Welcome page of the IBM Systems Director Web interface, click the **Manage** tab, and click **Update Manager**.
9. Click **Import updates** and specify the location of the downloaded files that you copied to the management server.
10. Return to the Welcome page of the Web interface, and click **View updates**.
11. Select the updates that you want to install, and click **Install** to start the installation wizard.

---

## Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

---

### Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the *IBM Documentation CD* that comes with your system.
- Go to the IBM support Web site at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

---

### Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/systems/support/> and follow the instructions. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

---

## Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x and xSeries information is <http://www.ibm.com/systems/x/>. The address for IBM iDataPlex information is <http://www.ibm.com/systems/x/hardware/idadaplex/index.html>. The address for IBM BladeCenter information is <http://www.ibm.com/systems/bladecenter/>.

You can find service information for IBM systems and optional devices at <http://www.ibm.com/systems/support/>.

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## Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation® workstations, and appliances. For information about which products are supported by Support Line in your country or region, see <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

---

## Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find a Business Partner** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

---

## IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路 7 號 3 樓  
電話：0800-016-888

IBM Taiwan product service contact information:  
IBM Taiwan Corporation  
3F, No 7, Song Ren Rd.  
Taipei, Taiwan  
Telephone: 0800-016-888

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## Appendix B. Notices

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

---

## Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server, IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 6. Limits for particulates and gases

| Contaminant | Limits   |
|-------------|--|
| Particulate | <ul style="list-style-type: none"><li>The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2<sup>1</sup>.</li><li>Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.</li><li>The deliquescent relative humidity of the particulate contamination must be more than 60%<sup>2</sup>.</li><li>The room must be free of conductive contamination such as zinc whiskers.</li></ul> |
| Gaseous     | <ul style="list-style-type: none"><li>Copper: Class G1 as per ANSI/ISA 71.04-1985<sup>3</sup></li><li>Silver: Corrosion rate of less than 300 Å in 30 days</li></ul>   |

<sup>1</sup> ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

<sup>2</sup> The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

<sup>3</sup> ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

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## Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a Web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development  
IBM Corporation  
205/A015  
3039 E. Cornwallis Road  
P.O. Box 12195  
Research Triangle Park, North Carolina 27709-2195*

U.S.A.

In the request, be sure to include the publication part number and title.

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## Telecommunication regulatory statement

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, nor is it intended to be used in a public services network.

---

## Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

## Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

## Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## Australia and New Zealand Class A statement

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

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Responsible manufacturer:

International Business Machines Corp.  
New Orchard Road  
Armonk, New York 10504  
914-499-1900

European Community contact:

IBM Technical Regulations, Department M456  
IBM-Allee 1, 71137 Ehningen, Germany  
Telephone: 0049 (0) 7032 15-2937  
E-mail: tjahn@de.ibm.com

## Germany Class A statement

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### **Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

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**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.  
New Orchard Road  
Armonk, New York 10504  
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland  
Technical Regulations, Department M456  
IBM-Allee 1, 71137 Ehningen, Germany  
Telephone: 0049 (0) 7032 15-2937  
E-mail: tjahn@de.ibm.com

**Generelle Informationen:**

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

## Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

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高調波ガイドライン適合品

jeita

Japanese Electronics and Information Technology Industries Association (JEITA)  
Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

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Please note that this equipment has obtained EMC registration for commercial use. In the event that it has been mistakenly sold or purchased, please exchange it for equipment certified for home use.

## Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А. В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

rosemi

## People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声明

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## Taiwan Class A compliance statement

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